



National Aeronautics and  
Space Administration

**GSDO-PLN-1076-ANX-01**

**REVISION F**

**RELEASE DATE: 02/12/2021**

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## **CROSS-PROGRAM**

# **OPERATIONS AND MAINTENANCE REQUIREMENTS AND SPECIFICATIONS MANAGEMENT PLAN**

## **ANNEX 01: OPERATIONS AND MAINTENANCE REQUIREMENTS AND SPECIFICATIONS MANAGEMENT SYSTEM BUSINESS PRACTICES**

### **NOT EXPORT CONTROLLED**

This document has been reviewed by the KSC Export Control Office and it has been determined that it does not meet the criteria for control under the International Traffic in Arms Regulations (ITAR) or Export Administration Regulations (EAR).

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## REVISION AND HISTORY PAGE

| Status   | Revision No. | Change No. | Description  | Release Date |
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|          | D |  | <p>Revision D (Approved at JICB, per GSDO D0743-X, dated 01/23/2018)</p> <p>Prepared By: Jeffrey Scheick<br/>Process Integration<br/>EGS Program Office</p> <p>Change Summary: Updates to OMRS Deviation/Waiver content and processing, RCN processing, OMRS System Information, OMRS Retest reports, added additional detail for CUI content in the OMRS, FMEA/CIL Criticality clarifications, documentation updates and minor format updates. Closes directive action ESD-MD-12026-03 by removing GSDO-CHTR-1128 and adding ESD-MD-12026.</p>                         | 02/15/2018 |
| Revision | E |  | <p>Revision E (Approved at JICB, per GSDO-D0994-X, dated 04/16/2019)</p> <p>Prepared By: Jeffrey Scheick<br/>Process Integration<br/>EGS Program Office</p> <p>Change Summary: Process updates to OMRS Deviation/Waiver sections, updated Applicable Documents, clarification that citing released engineering applies to sub-descriptions, added agreements for LOLI processing in conjunction with LSAIB LOLI content, updates to Appendix A OMRS Data Attributes Definition; Rational and Consequences description, and Appendix B Acronyms &amp; Abbreviations.</p> | 06/12/2019 |

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| Revision | F |  | <p>Revision F (Approved at JICB, per GSDO-D1296-X, dated 02/02/2021)</p> <p>Prepared By: Jeffrey Scheick<br/>Process Integration<br/>EGS Program Office</p> <p>Change Summary: Updates for Daily Board, OMRS Panel Resources, TBD solved, applicable and reference document updates, add CUI standard upload file format, OMRS sequencing, provide for OMRS Telemetry excursions, define OMRS to LCC transition, clarify Cautions and Warnings usage, delete FMEA/CIL Crit code from OMRS pdf, LOLI guidance, clarify mission specific triggers, Artemis missions, clarify OMRS numbering schema, delete RCN justification and add RCN change description, rationale and OMRS Panel annotations, clarify Documentation RCN process, delete OMRS, RCN and D/W status acronym codes not utilized, add D/W work flow status definitions, updated OMRS data field examples and editorial changes. Added TBD for OMRS with GSE impact process, and TBR for requirement sequencing within an OMRS.</p> | 02/12/2021 |
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## **1.0 INTRODUCTION**

Note: Exploration Systems Development Management Directive ESD-MD-12029, November 16, 2017, establishes the Exploration Ground Systems (EGS) Program name and retires the name Ground Systems Development and Operations (GSDO). There is no change in scope or architecture for EGS. Documentation may still contain references to GSDO until revisions are completed through normal updates. GSDO will remain as part of the document number.

### **1.1 PURPOSE**

The Operations and Maintenance Requirements and Specifications Management System (OMS) Business Practices establishes the essential processes needed to affect standard operating procedures in a consistent manner to manage the Operations and Maintenance Requirements and Specifications (OMRS) content and content changes for EGS, Orion and Space Launch System (SLS) Programs.

The business annex is the implementation and not a duplication of GSDO-PLN-1076, Cross-Program OMRS Management Plan, and will further define requirement management, change control processes, work control and integration, closed-loop accounting and traceability.

The business annex addresses the management of the technical content of the OMS application and the business processes to plan, develop, change, and disposition that technical content.

### **1.2 SCOPE**

OMRS apply to Cross-Program pre-launch, launch, and post-flight operations of the flight and ground hardware. All pre-launch, launch, and post-flight plans and procedures used for these operations shall be in agreement with the OMRS.

The OMS software application, as referenced herein, is the repository and database application for activities for all OMRS, Requirements Change Notices (RCNs), and deviations and waivers.

Business practice changes are applicable to future OMRS changes and are to be applied as OMRS are updated for technical reasons. Approved OMRS will not be updated retroactively to comply with GSDO-PLN-1076-ANX01 updates.

### **1.3 CHANGE AUTHORITY/RESPONSIBILITY**

Proposed changes to this document shall be submitted by an EGS Program Change Request to the Joint Integration Control Board (JICB) for consideration and disposition.

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All such requests will adhere to the Configuration Management (CM) Change Process as defined in GSDO-PLN-1001, Ground Systems Development and Operations Information and Configuration Management Plan.

The NASA Office of Primary Responsibility identified for this document is EGS Systems Engineering and Integration Division.

The Cross-Program OMRS is authorized by the requirements of GSDO-PLN-1076.

OMRS change authority is per Operations and Maintenance Requirements and Specifications Panel (OMRSP) defined in ESD-MD-12020, OMRS Panel (OMRSP) Charter. Additional information is in GSDO-PLN-1195 Cross-Program Processes and Agreements for Launch Site Ground Operations.

#### **1.4 PERMANENT OMRS CHANGES WILL BE CONTROLLED BY RCNS AND TEMPORARY CHANGES BY OMRS DEVIATION OR WAIVER WITHIN OMS.VERB APPLICATION**

Throughout this document statements containing the following verb are defined as such:

- a. "Shall" – Used for binding requirements (verification not required)
- b. "Should" – Used to indicate a statement of best practice
- c. "Will" – Used to indicate a statement of fact, declaration of purpose, or expected occurrence

## **2.0 DOCUMENTS**

### **2.1 APPLICABLE DOCUMENTS**

The following documents include specifications, models, standards, guidelines, handbooks, and other special publications. The documents listed in this paragraph are applicable to the extent specified herein.

|              |  |
|--------------|--|
| NPD 2200.1   | Management of NASA Scientific and Technical Information  |
| NPD 2800.1   | Managing Information Technology  |
| NPR 2200.2   | Requirements for Documentation, Approval and Dissemination of Scientific and Technical Information |
| CEV-T-046000 | Exploration Mission Flight Data and Command Dictionary (EM DCD)                                    |

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| GSDO-PLN-1001        | Ground Systems Development and Operations Program Information and Configuration Management Plan                        |
| GSDO-PLN-1073-ANX-01 | Cross-Program Launch Site Integrated Test and Checkout Plan, Annex 01: Launch Site Integrated Test Objective Reports   |
| GSDO-PLN-1036        | Exploration Ground Systems Program Safety and Mission Assurance Plan   |
| GSDO-PLN-1155        | Cross-Program Landing and Recovery Nominal End-of-Mission Recovery Plan  |
| GSDO-PLN-1183        | Ground Systems Development and Operations Program Ground Operations Implementation Plan                                |
| GSDO-PLN-1195        | Cross-Program Processes and Agreements for Launch Site Ground Operations   |
| GSDO-FM-1263         | Cross-Program OMRS Deviation Waiver Form   |
| GSDO-6000            | EGS Program Product Breakdown Structure for Artemis I  |
| ESD 10010            | Exploration Systems Development Safety and Mission Assurance Plan  |
| MAS-02               | Mission Assurance Systems (MAS) Software Configuration Management Plan   |
| MPCV 72524           | Orion Multi-Purpose Crew Vehicle (MPCV) Operations Nomenclature Plan   |
| SLS-PLAN-100         | Space Launch System Program Exploration Mission-1 (EM-1) Flight Evaluation Plan  |
| ESD-MD-12020         | Exploration Systems Development (ESD) Operations and Maintenance Requirements and Specifications Panel (OMRSP) Charter |
| ESD 10017            | Exploration Systems Development Flight Test Strategy and Objectives  |

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| MPCV 70043     | Orion Multi-Purpose Crew Vehicle (MPCV) Program Hardware Failure Modes and Effects Analysis/Critical Items List (FMEA/CIL) Requirements Document         |
| MPCV 72540     | Orion Multi-Purpose Crew Vehicle (MPCV) Program: Exploration Mission One (EM-1) and Exploration Mission Two (EM-2) Flight Test Objectives                |
| SLS-VDD-220-01 | Cross-Program Integrated Measurement and Command System (IMACS) Dataset Version Description Document, Volume 1: SLS Vehicle - Block 1                    |
| SLS-VDD-220-02 | Cross-Program Integrated Measurement and Command System (IMACS) Dataset Version Description Document, Volume 2 Interim Cryogenic Propulsion Stage (ICPS) |
| SLS-RQMT-016   | Space Launch System (SLS) Program Failure Mode and Effects Analysis/Critical Items List (FMEA/CIL) Requirements  |
| SLS-SPEC-028   | Cross-Program Integrated Vehicle Structural Design Specification   |

## 2.2 REFERENCE DOCUMENTS

The following documents contain supplemental information to guide the user in the application of this document.

|                   |  |
|-------------------|--|
| EIA-649           | Configuration Management Standard  |
| GSDO-6004         | EGS Program Product Breakdown Structure for Exploration Mission-2                                  |
| GSDO-ACO-1010     | Ground Systems Development and Operations Program Architectures and Concept of Operations Document |
| GSDO-RPT-1169     | Ground Systems Development and Operations Program Ground Operations Planning Database Data Set     |
| GSDO-MVVP-1042-01 | Ground Systems Development and Operations Program Master Verification and Validation Plan          |

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|----------------------|--|
| GSDO-PLN-1002        | Ground Systems Development and Operations Program Systems Engineering Management Plan  |
| GSDO-PLN-1027        | Cross-Program Ground Hardware/Software Acceptance Data Package Plan  |
| GSDO-PLN-1055        | Cross-Program Ground Hardware Integration Plan   |
| GSDO-PLN-1129        | Cross-Program Integrated Launch Operations Implementation Plan   |
| GSDO-PLN-1076-ANX-02 | Cross-Program Operations and Maintenance Requirements and Specifications Management Plan, Annex 02: Operations and Maintenance Requirements and Specifications Management System Data Requirements and Design Specifications |
| GSDO-PLN-1088        | Ground Systems Development and Operations Program Certification of Flight Readiness Implementation Plan for Exploration Mission 1  |
| GSDO-PLN-1143        | Cross-Program Flight Hardware And Software Acceptance Data Package Plan  |
| ESD 10005            | Exploration Systems Development Configuration and Data Management Plan   |
| ESD 10016            | Enterprise Verification and Validation Plan  |
| ESD 10020            | Exploration Systems Development Certification of Flight Readiness Plan   |
| ESD 10026 – EM1      | Exploration Systems Development Mission Definition Baseline for Artemis I  |
| ESD-MD-12002         | Exploration Systems Development Control Board Charter  |
| ESD-MD-12011         | Joint Program Control Board (JPCB) Charter   |
| ESD-MD-12012         | Joint Integration Control Board (JICB) Charter   |
| ESD-MD-12026         | Cross-Program Operations Engineering Review Board Charter  |

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| ESD-MD-12028   | Exploration Systems Development Daily Board Charter                                   |
| GSDO-SPEC-1134 | Exploration Ground Systems Program Compact Unique Identifier Definition Specification |
| CP-LMS         | Cross-Program Launch Commit Criteria LMS Business Practices                           |

## 2.3 PARENT DOCUMENT

The following document is the higher level specification, standard, guideline, handbook, special publication, or requirement document containing the requirement driving the creation of this document. In the event of a discrepancy between the requirements in this document and its parent document, the parent document takes precedence.

|               |  |
|---------------|--|
| GSDO-PLN-1076 | Cross-Program Operations and Maintenance Requirements and Specifications Management Plan |
|---------------|--|

## 3.0 OMRS APPLICABILITY

The OMRS is a Cross-Program product.

### 3.1 BUSINESS PRACTICES ANNEX

This document contains the purpose, scope, and authority for OMRS processing. It includes descriptions of the business practices required to manage requirements and the process to change requirements.

The OMRS Panel Wiki provides RCN/OMRS process guidance, such as action items, OMRSP guidelines, tools and processes, meeting agendas and minutes, contact lists, and additional information.

Note: Process guidance and OMRSP guidelines that change scope will be documented and approved on a Cross-Program change request.

## 4.0 OMRS DATABASE AND DATA MANAGEMENT

OMRS is contained in a database of related records that reside in OMS. All applicable organizational elements will have access to the OMRS. Portable document format (.pdf) reports for individual records or multiple records can be generated.

The data of the OMRS is subject to two types of management:

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- a. "OMRS database management" addresses CM of the database (i.e., validating and maintaining the database tables and the system software). Reference MAS-02, MAS Software CM Plan.
- b. "OMRS data management" addresses planning, development, and management of the data content stored within the database and is configuration controlled by the change processes described in this document.

The mandatory OMRS data fields are defined by Appendix A. The database structure, definitions of database records and fields, and the field values, are contained in GSDO-PLN-1076-Annex 02: OMRS Management System Data Requirements and Design Specification.

#### **4.1 OMRS DATABASE MANAGEMENT**

OMS maintains the CM of OMRS records, incorporation of approved RCNs, deviations and waivers, and the validation and maintenance of the database. A sandbox/training instance of the OMS application is available which does not interface with or affect production data.

#### **4.2 DATABASE SOFTWARE CHANGES**

The change process for the database structure and/or application software is documented in MAS-02.

#### **4.3 OMRS DATA MANAGEMENT**

EGS, Orion, and SLS Programs are responsible for the planning, development, and the technical content of their respective OMRS.

#### **4.4 GENERATING NEW AND CHANGING APPROVED OMRS DATA**

The OMS application provides for new OMRS, permanent OMRS changes and temporary OMRS changes to the approved OMRS content. New OMRS and permanent changes to the OMRS are processed by an RCN. A temporary change to the OMRS content is processed by a deviation or waiver, which provides a detailed description of the temporary change and rationale. Unlike RCNs, deviations and waivers do not change the technical content of the OMRS requirements in the database.

An OMS account is requested and provisioned thru Identity Management and Account Exchange (IdMAX) system using the NASA Access Management System. Note: Search for "CP-OMS."

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## **5.0 OMRS TECHNICAL CONTENT GROUND RULES**

### **5.1 CROSS-PROGRAM OPERATIONS NOMENCLATURE**

Requirements levied on Kennedy Space Center (KSC) via approved OMRS implemented from Vehicle power-up for launch through completion of recovery, that have wording associated with flight crew, flight or ground controller interfaces are to align with OpNom requirements per MPCV 72524, Cross-Program Operations Nomenclature Database, Sec 4.3.2, OMRS and Launch Commit Criteria and as contained ESD-DB-OpNom, Cross-Program OpNom Database. Products derived from OMRS technical content are to use terms and operational nomenclature consistent with the OMRS.

### **5.2 OMRS SYSTEM INFORMATION**

System Information is included for each OMRS system grouping and does not have an effectivity. The information provided as system information should not be construed as discrete requirements or constraints and does not require a deviation or waiver if violated, and are not traceable or closed-loop tracked to work implementation documents. System Information is optional. System Information will be numbered, include a title and text, and be the first OMRS record for an applicable system (e.g., Program.Component.System.0000, see Section 7.1). System Information will require a Documentation RCN (see Section 10.6) to revise the content.

System Information can be utilized to provide information related to cleanliness requirements, retest requirements, safety procedures, protective clothing, general inspection conditions, related documentation, functional descriptions, system and/or subsystem background, notes, terminology, definitions, acronym and abbreviation definitions, or unique information related to a group of OMRS requirements.

### **5.3 OMRS RETEST REPORTS**

Retest reports reflect requirements associated with Line Replaceable Unit (LRU), component and/or connector retest. Retest data is defined by a drop-down field listing of applicable hardware for each OMRS record associated with mission specific and general categories.

### **5.4 FILE ATTACHMENTS**

Attachments provide the capability to add documentation to an OMRS. Items captured can include software application generated documents, tables, figures, complex formulas, etc. Attachments should be commonly recognized and supported file formats enabling the information to be accessed from OMS, downloaded and displayed on the user's standard computer software configuration. The user's standard computer

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software configuration should meet the government issued computer software load and external entities would need to use software programs that are compatible.

Attachments may be linked to an entire OMS record, or specifically to OMRS description or specification. If the specification cannot be succinctly defined by a value or statement, attachments may be utilized to define the specification (e.g., temperature vs. pressure curves).

Released engineering (e.g., drawings, specifications) are not to be added as an attachment to an OMRS. Released engineering related to OMRS are to be obtained from the applicable program CM release authority.

For the most current version of OMRS attachments, the user should retrieve attachments from OMS.

NASA information classification and marking policies apply to attachments, as described in Section 6.3.6.

When the OMS record is approved, the OMS attachment is locked. OMRS attachments are part of the OMRS record and controlled by the RCN process.

For Compact Unique Identifier (CUI) data imports see section 6.4.2.1 CUI upload to OMRS record.

## **5.5 CITING RELEASED ENGINEERING IN OMRS**

OMRS should be self-contained, meaning that the technical information to implement the requirement should be contained in the OMRS. Attachments to the OMRS defining the pass/fail specification criteria may be used if needed.

The released engineering (e.g., drawings, specifications, or documents) will be cited in the reference field and may also be cited in the remarks field of the OMRS and are considered to be the latest revision unless specified. The responsibility for obtaining the latest revision and date information is incumbent upon the user.

For simple released engineering specifications, the OMRS should be built from the released engineering, i.e., the technical information will be copied directly into the applicable OMRS fields, and the source noted in the reference field in OMS to maintain CM.

For complex released engineering, where the Program/Element determines the OMRS standalone criteria cannot be met, pointing to the applicable specifications is acceptable with the following conditions:

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- a. The released engineering product will be cited in the OMRS description field.
- b. The specification field and/or the sub-description will contain a pointer to the appropriate paragraph, section or table contained in the released engineering.
- c. The Program/Element will provide access to their released engineering products affecting OMRS.
- d. For released engineering that is not already part of the EGS Baselines, the released engineering revision designator will be identified in the Launch Site Assembly and Integration Baseline (LSAIB) and maintained as applicable. The authoritative source for the released engineering revision designator is provided by the LSAIB.

For Limited Operational life items (LOLIs) already part of the EGS baseline using the LSAIB process, pointing to the KSC allocated cycles or operating time is acceptable with the following conditions.

- a. The released LOLI product (document or specification) will be cited in the OMRS description field.
- b. The specification field and/or the sub-description field will contain a pointer to the appropriate paragraph, section or table containing the KSC allocated cycles.
- c. The Program/Element will provide access to their released LOLI product in an ingestible format (e.g. Excel) to support Configuration Accounting & Verification.
- d. The LOLI product revision designator is provided by the LSAIB.

## **5.6 OMRS CITING OTHER OMRS**

Citing other OMRS within OMRS may be required in certain situations and is allowable under the following circumstances.

### **5.6.1 Mandatory Sequence of Implementation**

OMRS may establish associations with other OMRS to establish a mandatory sequence of implementation. This mandatory sequence indicates there is no alternate implementation order for the OMRS. In this case, each description field will identify the unique requirement identifier (i.e., S.RS25.ESIH.0020) and will have a pass/fail indicating successful execution of the requirement.

### **5.6.2 OMRS Referencing other OMRS for Implementation**

For cases where the implementation sequence is not mandatory, only the remarks field and/or the reference field may be used to cite other OMRS numbers.

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## **5.7 OMRS DESCRIPTIONS AND ORDER OF PERFORMANCE**

By default, OMRS shall be performed in order of the descriptions as presented in the PDF output report, unless coordinated with the design authority. <TBR 5.7-1>

## **5.8 OMRS PARALLEL EXECUTION RESULTING IN TEMPORARY TELEMETRY EXCURSIONS**

OMRS telemetry excursions may be caused by a temporary loss of data during continuous monitoring. Other OMRS executed in parallel can drive configuration changes resulting in interruptions of telemetry. For excursions that are expected and remain within nominal limits after the data is restored, no OMRS waivers are required. Examples: planned changes in telemetry format or frequency, and pump switchovers.

## **5.9 OMRS DURING LAUNCH COUNTDOWN**

OMRS that support launch countdown establish the required Vehicle and Ground Support Equipment (GSE) configuration. Launch Commit Criteria (LCC) become active at the decision “Go for Cryo Tanking” decision point. OMRS during the LCC time frame will be Mission Specific category. OMRS are required to be linked to their related LCC ID.

General OMRS during launch countdown [effectivity] may be used only prior to the LCC time frame. Contingency OMRS may apply during launch countdown. Mission Specific OMRS with an effectivity in the LCC timeframe will be linked to any related LCC. In the event of a launch scrub, LCCs are no longer applicable, scrub contingency OMRS become invoked and applicable General OMRS become active again.

Regardless of Category, OMRS parameters not monitored by LCC will be observed for non-conformance conditions throughout launch countdown.

### **5.9.1 Mission Specific OMRS- OMRS Verification (Response Confirmation) Required during LCC Time Period (Related LCC)**

#### **1. After the decision for “Go for Cryo Tanking” and prior to GLS Mainline Initiation**

- a. Commands and verifications are listed in the Mission Specific OMRS. The OMRS will close after configuration is established. Continuous monitoring will be performed by the related LCC and LCC parameters only. There will be no continuous monitoring in the OMRS.
- b. Where Critical to Mission Success, Mission Specific OMRS will contain the T-minus or L-minus times for command execution using constraints for mandatory execution times, and remarks for approximate execution times.
- c. Use a remark with the related LCC ID to state the OMRS specifications will be verified and monitored by LCC.

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## 2. From GLS Mainline Initiation (Terminal Count) to T-0

Terminal Count is defined in GSDO-PLN-1129 Cross-Program Integrated Launch Operations Implementation Plan, e.g., for Artemis I Terminal Count starts T-10 and counting.

All automated commanding is performed by Ground Launch Sequencer or Cryogenic Sequencer, or is part of a closed-loop control sequence.

- a. OMRS executed by GLS will include all flight and ground commands. Flight OMRS should contain the final ground commands needed to engage the flight system. EGS has the responsibility to develop Ground OMRS that configure ground systems to support launch.
- b. Where Critical to Mission Success, Mission Specific OMRS will contain the T-minus times for command execution. Constraints will be used for mandatory execution times.
- c. Use a remark with the related LCC ID to state the OMRS specifications will be verified and monitored by LCC.

### 5.9.2 Mission Specific OMRS- OMRS Verification (Response Confirmation) Not Required during LCC Time Period (No related LCC)

#### 1. OMRS that do not configure for an LCC, the following apply:

- a. Commands are listed in the OMRS.
- b. Verification of commands are not required to be listed in OMRS.
- c. If verifications are listed in the OMRS, then a constraint will be added signifying specifications are not a constraint to launch.
- d. GLS will take no action on command verifications.

## 6.0 OMRS REQUIREMENT COMPONENTS

All mandatory information should contain enough detail so that the requirement intent and requirement implementation can be understood by the Program elements and the implementing organization. The Cross-Program should understand its risk acceptance posture. Fundamental understanding of OMRS requirements, consequences of non-performance, and consequence of waiver/deviation acceptance is therefore recommended at all times. The data associated with OMRS in concert with other information should support the risk baseline understanding. Note: Non-technical information should not hold up the approval of an OMRS (e.g., a LCC ID, reference information).

Each OMRS requirement consists of the following components (further descriptions, acceptable values, and examples are provided in Appendix A).

- a. Requirement Number and Title (See sections 6.1 and 6.2)
- b. Basic Information (see Section 6.3)

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- c. Requirement Description, CUIs, Specifications (see Section 6.4)
- d. Cautions, Warnings, Constraints and Remarks (see Section 6.5)
- e. Safety Documents, Criticality (Failure Mode and Effects Analysis [FMEA]/CIL or Reliability and Safety Assessment Reports [RSAR]), and Program Hazard Reports and Exploration Systems Integration (ESI) Hazard Causes (See sections 6.6, 6.7 and 6.8)
- f. Other Related Documents - Attachments, References, related LCC (See Section 6.9)
- g. Rationale and Consequences Statements (see Section 6.10)
- h. Specification Derivation (see Section 6.11)
- i. OMRS Status (see Section 6.12)
- j. Test Plans (see Section 6.13)

## **6.1 REQUIREMENT NUMBER**

Each requirement will have a unique number generated by the OMS software, based on user inputs. (See Section 7.1 for requirement number format.)

## **6.2 REQUIREMENT TITLE**

Each requirement will have a short descriptive one line title for report generation purposes.

Titles may be repeated, though it is suggested to list keywords in the title for ease of reference and distinction. Titles should not contain sensitive information.

Requirement Title Examples:

- a. Mobile Launcher Liquid Hydrogen Leak Detector Test
- b. Liquid Hydrogen Umbilical Pressure Integrity Check

## **6.3 BASIC INFORMATION**

Each requirement contains the following basic information attributes, as applicable:

- a. Element
- b. Component
- c. System

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- d. Program Model Number (PMN) for EGS GSE only, if applicable (Reference GSDO-PLN-1055). The PMN System Name and Unit Code are populated from the KSC Operations, Maintenance, Engineering, and User database.
- e. Key – Program/Project reference data
- f. OMRS Category
- g. Trigger
- h. Work Flow visibility and Information Classification
- i. Effectivity
- j. Interval Units and Interval Number

#### **6.3.1 Element and System**

The element, component and system are defined by the applicable EGS, Orion, and SLS Programs.

#### **6.3.2 Program Model Number**

PMNs are utilized to facilitate the identification and tracking of GSE used by EGS at the launch and recovery sites. An OMRS record can have one PMN assigned to it.

#### **6.3.3 Key**

An internal program/project/contractor number space is provided under "Basic Information" for government or contractor use for any internal number they desire for traceability back to the originating or heritage requirement or document.

#### **6.3.4 OMRS Category**

All OMRS requirements must be assigned to one category.

OMRS Categories:

- a. General - Examples of General OMRS include: standard cleanliness, sharp edge and closeout inspections, element weight logs, fluid inventory, and corrosion control. General OMRS may have a trigger, but a trigger is not required.
- b. Mission Specific - Examples of mission specific OMRS include: servicing an element, element testing, interface testing, closeouts, validation requirements, and any payload unique requirements. Mission specific OMRS must be performed at least once per nominal mission planning. See section 6.3.5.1 for Mission Specific OMRS Trigger details.

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- c. Contingency - Examples of contingency OMRS include: launch scrub or recycle configuration, roll-back preparations, and safing to protect hardware or personnel. A requirement shall be identified as contingency only when a specified contingency invokes the requirement. A narrative description of this specific contingency will be placed in the trigger field.
- d. GSE - Examples of GSE OMRS include: requirements for the operations, maintenance, or test configurations of GSE systems or the components within the system when interfacing with flight hardware to safely execute testing or operations. Note: OMRS strictly for ground systems should always be identified as GSE, even if they have a contingency and/or limited life impact.
- e. LOLI - Examples of LOLI OMRS include specifying: the number of open and close cycles on hatches, the number of mate/demate quick-disconnects cycles, or the amount of accumulated power-on time of components. LOLI hardware requirements shall be planned for performance on or before the flight on which the time/cycle limit is projected to be exceeded. The initiation or start of a requirement should be provided in the Trigger field. The LOLI category is strictly for flight hardware use.

Note: LOLI OMRS should be written for items that are at risk of exceeding their allotment for ground processing mission operations. Examples: If predicted hardware usage at the launch site plus pre-hardware turnover usage is greater than 25% of the cycles or operating time limits exceeding design/qualification limitations, a LOLI OMRS should be provided. If the potential exists for an item to expire within 2 years of the Stacking milestone, the Program/Element (hardware provider) should provide a LOLI OMRS unless tracked by the design authority. Definitive limits are guidance only and dependent on the specifics of the hardware.

- f. Off-Nominal - Examples of off-nominal OMRS are LRU retest requirements and connector retest. Off-Nominal OMRS require that a Trigger specify the event(s) that will invoke performance of the off-nominal OMRS. Reference GSDO-PLN-1076 for Off-Nominal work flow.

### 6.3.5 Trigger

This field is provided to enter a circumstance, event, or condition that necessitates the OMRS to be executed. This field should contain a positive statement describing what drives the OMRS to be implemented. For example, "Perform this OMRS in the event of a launch scrub."

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### 6.3.5.1 Mission Specific Triggers

A mission specific requirement does not typically have a trigger. When a mission specific OMRS does have a trigger the OMRS must be performed nominally and must be repeated based on trigger event or circumstances statements. A trigger for a Mission Specific OMRS identifies an event or circumstances which requires the OMRS to be repeated for nominal planning.

Triggers are not intended to define when to perform the OMRS.

Mission specific OMRS with:

1. No trigger are performed at least once based on the content of the OMRS.
2. One Trigger, are performed a minimum of one time and repeated based on pre-planned events (not safing, and not off-nominal conditions).
3. Two or more Triggers – all triggering events need to be listed.

### 6.3.6 OMRS Group Visibility Restrictions

The group visibility restrictions help ensure that controls for the protection of the confidentiality, integrity, and availability of information technology are integrated into the OMS application. The user may restrict OMRS visibility by roles defined in OMS by author and reader permissions.

The OMS application implements the corresponding level of access by enforcing group visibility restrictions based on the designated information classification required for protection from disclosure, special handling safeguards, and prescribed limits on exchange or dissemination of the information.

Information classification in any form must be clearly marked by the requirement owner to provide the applicable information security level.

The information classifications (and corresponding group roles) applicable to OMRS:

- a. Sensitive But Unclassified (SBU)
- b. Export Administration Regulation (EAR)
- c. International Traffic in Arms Regulation (ITAR)
- d. Limited Rights - corporate owned proprietary information or restricted or limited Scientific and Technical Information (STI)
- e. Patent Information - Reference NPD 2800.1B, Managing Information Technology, NPD 2200.1B, Management of NASA STI and NPR 2200.2C, Requirements for Documentation, Approval, and Dissemination of NASA STI.

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### 6.3.7 OMRS Effectivity

OMRS effectivity will be in accordance with the following structure:

- a. EM-1 = Artemis I Mission
- b. EM-2 = Artemis II Mission
- c. GSE Maintenance (GM). This designation reflects that the OMRS applies to GSE that requires maintenance.
- d. Not Assigned, this designation reflects that the requirement is not assigned to a specific mission.

The effectivity applies to the entire requirement.

Note: Renaming of the Exploration Mission (EM) flights to Artemis flights, ESD-MD-12034: EM-1 & EM-2 to be replaced with Artemis I, Artemis II, etc.

### 6.3.8 Effectivity Examples

Selecting EM-1 makes the requirement effective for Artemis I only.

Selecting EM-2 makes the requirement effective for Artemis II only.

Selecting EM-1 and EM-2 makes the requirement effective for Artemis I and Artemis II.

Selecting “Not Assigned” signifies the requirement has not been assigned to a specific mission. Additional information must be provided in the OMRS to define the requirement implementation.

Selecting “GSE Maintenance (GM)” signifies that the OMRS applies to GSE that requires maintenance. Additional information must be provided such as interval units and interval number, and/or a statement in the trigger field. Additionally, when selecting “GM” as the effectivity, the OMRS category should be GSE. The selection of “GM” does not apply to flight hardware.

### 6.3.9 Interval Units and Interval Number

The interval unit and interval number define the time or cycle for periodic maintenance or operations.

For scheduling purposes, KSC launch processors shall plan the performance of requirements as stated in the effectivity, trigger and interval fields. EGS will plan to accomplish the interval requirements within the specified interval without exceeding the interval. If the requirement is accomplished early, accounting of subsequent performances will be reset consistent with actual performance.

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Interval requirements shall be planned for performance on or before the flight and/or date on which the requirement is due.

## 6.4 REQUIREMENT DESCRIPTION

The requirement description consists of several interrelated fields: Description, Sub-description, CUI, and Specification.

### 6.4.1 Description and Sub-description

The Description shall have a definitive statement of the requirement to be accomplished. The descriptive statement will use action words such as inspect, measure, perform, provide, and/or document. An OMRS requirement description may have multiple descriptive identifiers (e.g., D-1, D-2).

There may be an overall description of the intended requirement followed by sub-descriptions to clarify aspects of the requirement. A sub-description may provide additional detail such as specific hardware, command or measurement nomenclature.

As necessary, when command and measurement information is utilized, the sub-description should identify the functional path(s) and/or end item to be exercised and verified per the stimuli and response factors given in the specification field.

### 6.4.2 Compact Unique Identifiers

The CUI field is only utilized for CUI numbers. Test port numbers or other identification numbers which apply to the function will be in the OMRS sub-description field.

CUI numbers are defined in the Program authoritative CUI sources; Launch Control System (LCS) Information Architecture (IA) database, SLS-VDD-220-01, Cross-Program Integrated Measurement and Command System (IMACS) Dataset Version Description Document, Volume 1: SLS Vehicle - Block 1, and SLS-VDD-220-02, Cross-Program Integrated Measurement and Command System (IMACS) Dataset Version Description Document, Volume 2 Interim Cryogenic Propulsion Stage (ICPS), For Orion CEV-T-046000 Exploration Mission Flight Data and Command Dictionary (EM DCD), etc. All CUI for OMRS implementation must reside in the LCS IA database, reference GSDO-SPEC-1134, GSDO CUI Identifier Definition Specification.

CUI numbers should have a corresponding title in the sub-description field consistent with the source. For requirements that do not have an associated CUI, the CUI field shall be left blank. Additional CUI guidance is provided in Section 6.4.3 f.

CUI Notional Example:

CUI: SCEPPDABCD0131IV

**Sub-description:** BU-1 PTS Battery Voltage

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As an exception for the ICPS, where commands and measurements identifiers will not reside in LCS IA, the CUI field may be utilized for their specific command/measurement identifiers.

#### 6.4.2.1 Compact Unique Identifier Upload to OMRS Record

In place of attaching CUI data to an OMRS with a file attachment, an upload process is recommended to insert the CUI data into their appropriate OMRS fields. When using this process, a standard spreadsheet containing the following columns, see Figure 4 (with headers spelled correctly exactly as shown) will be utilized; Sub-description, CUI, Specification. Note: additional columns with data in the spreadsheet can be in the spreadsheet, but are ignored and not uploaded.

|   | A   | B                               | C             |
|---|---|---------------------------------|---------------|
| 1 | Sub-description                           | Compact Unique Identifier (CUI) | Specification |
| 2 | REMOTE SELECT COOLANT BYPASS VEHICLE PLC1 | GSRCRC7PRMA333BK                | BYPASS        |
| 3 | REMOTE SELECT COOLANT BYPASS VEHICLE PLC2 | GSRCRC7PRMB334BK                | BYPASS        |
| 4 | REMOTE SELECT COOLANT BYPASS VEHICLE PLC3 | GSRCRC7PRMC335BK                | BYPASS        |
| 5 | REMOTE SELECT COOLANT BYPASS VEHICLE PLC4 | GSRCRC7PRMD336BK                | BYPASS        |

**FIGURE 1 CUI UPLOAD EXAMPLE FORMAT**

#### 6.4.3 Specifications

Each requirement shall have a pass/fail criteria in the specification field. The Specification field identifies the pass/fail criteria necessary to satisfy the requirement description:

- The values and tolerances shall reflect the inaccuracies caused by environment, aging, configuration, GSE, etc.
- The values and tolerances shall include a data range (e.g., 28 VDC plus or minus 2 VDC, 350 psia plus or minus 20 psia, 24,608 kg/cm plus or minus 1406 kg/cm, 10 VDC minimum to 14 VDC maximum). Standard engineering symbols may be utilized in place of words.
- The values and tolerances shall be within the "certified to" limits of the hardware.
- All measurements displayed by the LCS and other approved command and control systems should be specified in terms of engineering units per flight

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systems. If the telemetry from the vehicle display is in certain units then the ground display should match.

- e. OMRS specifications (pass/fail criteria) will be definitive and met by verifiable data. OMRS specifications should capture limits or success criteria (e.g., minimum or maximum values, ranges, on/off), and will be associated with constraints that are required to meet the pass/fail criteria.

Vague or non-specific limitations in the OMRS should only be defined in the remarks fields. Notional example:

- 1. Description: Monitor gaseous oxygen vent hood/tank thermal protection system interface. Any leakage observed between the seal and the tank is to be classified as a small leak (See R-2) or a large leak (See R-3).

Specification: No large leak (See R-3)

Remarks

R-1: Classification of a leak as small or large will be made on a real-time basis.

R-2: Small leak: slight puffing of vapor from area of seal footprint/tank interface with little force behind vapor.

R-3: Large leak: continuous leak of vapor from area of seal footprint/tank interface with some force behind vapor.

- f. For the specifications that are based on a CUI, the pass/fail criteria will be consistent with the CUI source (e.g., parameters, values). However, any baselined OMRS will be revised by EGS, and only in the event of missing or erroneous information.
  - 1. Use of specifications that apply to enumerated CUIs will match the authoritative sources, including syntax.
    - i. For specifications that rely on an enumerated CUI value (e.g. ON/OFF, OPEN/CLOSED, etc.), the pass/fail criteria will be specified using only enumeration labels allowed by the source. If available, the Operations Nomenclature label will be used in lieu of the Engineering Label or other label field.
  - 2. Use of specification field that apply to modifiable commands CUIs will match the authoritative sources, including syntax.
    - i. Command CUIs utilizing parameter values as enumerated values (e.g., Inhibit or Uninhibit), there is no need to state the value of the

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enumeration (e.g., 1 or 0). The pass/fail criteria will reflect implementation of approved Operations Nomenclature labels. The Operations Nomenclature labels field supersedes an Engineering Label or other Label field.

- ii. Command CUI parameters utilizing numeric values will be provided in engineering units as specified by the authoritative source.
- iii. Command CUIs require all associated parameter values to be in the specification, and identified exactly as per the authoritative source.
- iv. Where the parameter value is determined to have no impact on the evaluation of the OMRS, the parameter value will include an associated remark noting that the value of that parameter has no impact to the performance or satisfaction of the requirement.
- v. Parameters names may be associated with parameters in the specification field, or linked via remarks. Parameter names will be associated with numeric parameter values when a command requires more than one parameter with a numeric value.
- vi. If attachments are to be used the same rules above apply, and the attachments will be linked to specific description or specification in the OMRS.

By exception, a blank value is acceptable in the specification field for a predefined command CUI.

- g. The specification defines the operating life limit for LOLI requirements.

## 6.5 CAUTIONS, WARNINGS, CONSTRAINTS AND REMARKS

The requirement content contains provisions for cautions, warnings, constraints and remarks. This area shall contain only information necessary to clarify the requirement (e.g., constraints, safety precautions specific to the requirement). Cautions, warnings, constraints and remarks can apply to the entire OMRS record or to individual descriptions or specifications linked by direct association in the OMS application.

Parenthetical references to the cautions, warnings, constraints and remarks do not need to be manually added to the OMRS. Cautions, warnings, constraints and remarks that apply to the entire OMRS are displayed on the requirement title row in the OMRS report. Cautions, warnings, constraints and remarks that apply to specific descriptions and/or specifications are displayed on the associated row in the OMRS report.

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### 6.5.1 Cautions and Warnings

Cautions and warnings will be titled as such and the title will be left justified on the first line of the "Caution" or "Warning" statement in the OMRS report. "Caution-X" and "Warning-X" are supplied by the software (e.g., Caution-1, Caution -2, Warning-1, Warning-2). If a Caution or Warning are not referenced to a specific description or specification, it shall apply to the entire requirement.

Cautions are statements or advisories of operational practice which, if not strictly observed or adhered to, could result in equipment damage. Warnings are statements or advisories of operational practice which, if not strictly observed or adhered to, could result in personal injury or death. See Appendix A for additional information.

The intent of Cautions and Warnings statements will be captured in the Work Authorization Documents (WADs) if not mitigated or incorporated in ground processing software.

### 6.5.2 Constraints and Remarks

Constraints and Remarks are identified with C-XX and R-XX, respectively, (e.g., C-1, C-2, R-1, R-2) and are supplied by OMS software. If a Constraint or Remark is not referenced to a specific description or specification, it shall apply to the entire requirement. See Appendix A for constraint and remark definitions and information.

The intent of Constraints will be captured in WADs, if not mitigated or incorporated in ground processing software.

The intent of any OMRS remark may be captured in a WAD. If remarks per stakeholder's agreements are to be captured in WADs, then annotate with "WAD" in the remark, see Appendix A Table A-1 for examples.

## 6.6 SAFETY INFORMATION

OMRS may be identified through programmatic documentation, Hazard Analysis (HA), FMEA and Critical Items List (CIL), Subsystem RSAR, Maintenance Engineering Analysis activity, Requirements Verification Matrices, and operational experience.

OMRS requirements versus Safety documentation and FMEA/CIL criticality assignments are maintained for each applicable OMRS. The purpose of this relationship is to provide reporting and traceability between the CIL retention rationale and the related OMRS controls.

Safety sources of requirements will be provided under Safety Information. OMRS requirements which are necessary for the control of hazards shall include the associated Hazard, RSAR and/or CIL number.

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## 6.7 FMEA/CIL CRITICALITY

For OMRS requirements which verify flight or ground hardware functionality, the single worst case criticality shall be identified. In cases where there is no applicable safety FMEA/CIL or RSAR documentation reference for a given OMRS, “None” is to be assigned to the criticality. The criticality assignments are as follows:

**TABLE 1 SAFETY DOCUMENTATION AND SAFETY VALUE ASSIGNMENTS**

| Safety Documentation                                | Assigned Safety Values                                  |
|---|---|
| FMEA/CIL Criticality                                | 1, 1R, 1R2, 1R3, 1R3+, 1SR, 1S, 2, 2R, 3                |
| RSAR Risk Item/Single Point Failures (for EGS only) | RSAR value for criticality equal to 1, 1R, 1S, 2, 2R, 3 |

The criticality definitions are in ESD 10010, GSDO-PLN-1036, MPCV 70043, and SLS-RQMT-016.

Note: The FMEA/CIL criticality safety values 1R3+ and 1SR apply to Orion only.

## 6.8 PROGRAM HAZARD REPORTS AND ESI HAZARD CAUSES

EGS, SLS, Orion, and ESI hazard verifications linked through the Cross-Program Hazard (CP-Hazard) application to an OMRS record are not under RCN control. However, changes to approved OMRS may affect the hazard control/accepted risk, and will be evaluated through the RCN process.

## 6.9 OTHER RELATED DOCUMENTS

OMRS may include attachments, references and related LCC. Links to other OMRS records within OMS may be identified.

## 6.10 RATIONALE AND CONSEQUENCES STATEMENTS

Each requirement shall have a statement of rationale and a statement of consequences identifying the consequence of not performing or not satisfying the requirement.

## 6.11 SPECIFICATION DERIVATION

The specification derivation field is used to provide a summary level statement detailing the origin of the specification. The specification origin may have evolved from technical data derived during design, test, analyses or other sources. If the derivation of the specification is formulated from a source such as heritage program, best practice, or lessons learned, it is acceptable to identify as such and these are defined as follows:

Heritage Data - Vetted technical data from past Programs (e.g., Shuttle, Delta) and associated projects or elements.

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Best Practices - A recognized method, process, technique for performing an operation or task.

Lessons Learned - Knowledge that is gained by experience from a previous successful mission, project, operation or encountered failures.

Other - Technical data from design, test, analyses, or another source.

If the technical rationale of the specification is known, then a summary level statement is listed outlining the supporting technical information for the OMRS specification value(s).

If the margin between the OMRS specification and the certification limit is known, that margin may be included. The certification limit is the value (using consistent units) that identifies the limiting “tested to” criteria for a prescribed configuration. References to supporting engineering documentation can be included. If information regarding the specification origin and/or technical rationale and/or certification limit is not available an annotation in the fields will be included in the OMRS record.

Specification Derivation is intended for numerical specification values but may be utilized for other criteria at the author’s discretion.

## 6.12 OMRS WORKFLOW STATUS

The OMRS workflow status reflects the state of the OMRS as it is processed from the time the OMRS is created, assembled into an RCN, and is dispositioned. The status designations for OMRS are similar in nature to the RCN status. Only persons assigned to certain roles will have the capability to promote and demote OMRS and RCNs. See Section 15.0.

**TABLE 2 OMRS STATUS**

| Status      | Notes   |
|-------------|---|
| Draft       | All new and revised OMRS are initiated as Draft in the OMS application by an author. Draft OMRS are not under revision control, although the OMS application provides change tracking through audit logs. When OMRS are in Draft status, they are viewable by limited permission groups of OMS account holders.   |
| Preliminary | Preliminary requirements are new requirements or proposed changes to approved requirements and are mature enough to be promoted. After the OMRS are promoted to preliminary status the preliminary OMRS are available to be assembled into an RCN. When the OMRS are in Preliminary status, they are viewable by all OMS account holders with the associated SBU permissions. |

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| Status       | Notes  |
|--------------|--|
| Review       | The OMRS records within the RCN are locked from further changes. Changes to the OMRS will require demotion of the RCN to preliminary to accommodate revisions.   |
| Board Review | After the votes have been submitted, the RCN will be promoted to Board Review for board disposition. The only changes permitted are Panel/Board directed changes. Only the Process System Administrator (PSA) can make Panel/Board directed changes.   |
| Approved     | Approved requirements are those OMRS that have been approved through the formal RCN process.   |
| Disapproved  | Disapproved requirements are those OMRS that have been disapproved through the formal RCN process.   |
| Superseded   | The Superseded status signifies that a new version of an existing OMRS has been approved, therefore the previous approved version becomes superseded. Previous OMRS versions are available in OMS application.   |
| Withdrawn    | Withdrawn status identifies unapproved OMRS records that will no longer be needed. Only draft or preliminary OMRS can be withdrawn. Add a brief description to the OMRS Working Comments to describe the reason for the OMRS withdrawal. If applicable, include where the requirement was moved to, for example, if the withdrawn OMRS content was moved to a non-OMRS system. |
| Removed      | The Removed status applies to the approved OMRS records where OMRS performance is not required or no longer required and have not been performed. These OMRS removed from the current baseline will be designated as "Removed" in the RCN.   |
| Historical   | The Historical status identifies those OMRS records that were approved and may have been implemented, deviated or waived and are no longer applicable to future missions. These OMRS requirements are inactive, and maintained in OMS application for viewing and historical purposes. The designation of the OMRS as Historical is a result of the RCN disposition.           |

### 6.13 ITCO TEST PLANS ASSOCIATED WITH OMRS

OMRS may be associated with Cross-Program Integrated Test and Checkout (ITCO) Test Plans. Test plans are in accordance with GSDO-PLN-1073-ANX-01, Cross-Program Integrated Test and Checkout Plan: Annex-01 Launch Site Integrated Test Objective Reports.

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OMRS are only associated with Test Plans if they exclusively satisfy Test Plan Objectives. OMRS performed during integrated testing that do not satisfy Test Plan Objectives should not be associated with a Test Plan.

For OMRS related to test plans there are two possibilities describing the relationship:

- a. OMRS written specifically to meet a Test Objective Report (TOR) objective during ITCO testing and not performed during nominal processing.

One (or more) Associated Test Plan(s) shall be associated to the OMRS for this possibility. In this case, the OMRS is written strictly to meet a Test Plan objective and this positive response of "Yes" is annotated in OMS. This response allows the OMRS to be planned and performed for the specified Test Plan(s) only.

- b. OMRS written for nominal processing and also performed during ITCO testing to meet a TOR objective.

In this case, the OMRS is not written strictly to meet a Test Plan objective and this negative response of "No" is annotated in OMS. This response allows the OMRS to be planned and performed during nominal processing and for the specified Test Plan(s).

## **7.0 REQUIREMENT, RCN, AND DEVIATION/WAIVER NUMBERING**

### **7.1 OMRS REQUIREMENT NUMBERING**

A unique requirement number shall be assigned to a single requirement. All requirement numbers are auto-generated by user inputs and systematic support from the OMS application and shall be in numeric sequence. Once a requirement number is approved, the number/requirement relation will not be altered.

#### **7.1.1 OMRS Requirement Numbers**

Cross-Program OMRS record numbers (CP-OMS #####) are assigned by the OMS application to draft OMRS when a new OMRS record or an OMRS revision is created.

When the new draft OMRS record is created, a template OMRS number is created based on selections made by the user, as defined below.

When the draft OMRS is promoted to the preliminary status, the OMS application assigns the OMRS requirement number to the OMRS record.

The OMRS number is comprised of four designators, each separated by a decimal point. The format is as follows "P.XXXXX.SSSS.1234". The first, second, and third designators are populated based on data selected by the user from predefined fields and the fourth component is auto-generated by the OMS application. For EGS Ground Hardware, the requirement numbers are derived from GSDO-6000, EGS Program

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Product Breakdown Structure. For Orion the requirement numbers are derived from CEV-T-031 Project Orion CEV Spacecraft Systems Requirements Specification. For SLS the requirement numbers are derived from SLS-SPEC-028 CP Integrated Vehicle Structural Design Specification, Figure C.

- a. The first designator is the Program. The Program designators are one letter and are as follows:

EGS = G, Orion = O, SLS = S.

- b. The second designator is determined by each program. See Annex 2 for the complete list of values.

Program with OMRS number, second designator examples

EGS Program (e.g., COMM, LRE, SOPE, VABE, MLE)

Orion Program (e.g., AVI, CRS, ECL, PRPCM)

SLS Program (e.g., BSTR, RS25, INTG, ICPS, CS)

- c. The third designator is the system/subsystem, reference Annex 2 for the representative list. See Annex 2 for the complete list of values.

Program with OMRS number, third designator examples

EGS Program (e.g., CAA, LH2, LO2, RFTS, 60Hz PWR)

Orion Program (e.g., CDH, CT, FSW, ATCS)

SLS Program (e.g., AS, TVC, Prop, Sep, Str, CD, TPS)

- d. The fourth designator is a sequential 4-digit zero-padded number which is systematically assigned by the OMS application. This sequential number is bound by the first, second and third designator. When the draft OMRS is created, OMS assigns ##### (e.g., G.MLE.60PWR.#####).

- e. The OMRS number assigned and displayed on the approved OMRS record does not change. When an approved OMRS is to be revised, an interim revision designator is assigned, and when the unapproved OMRS revision is approved, the superseded OMRS number is updated, see section 8.1.3.b. Version Cloning, below.

## 7.2 RCN NUMBERING

### 7.2.1 Draft RCN Numbers

The OMS application assigns a database record ID to the Draft RCN. The database record ID of a draft RCN number format is as follows: RCN Record ##### - Draft.

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## 7.2.2 RCN Numbers

When the draft RCN is promoted to the preliminary status, the OMS application assigns the RCN number to the RCN record.

The RCN number is comprised of three components. The format is as follows “Program-RCN-12345” where:

- The first component is the NASA Program designator. This component signifies which program initiated the RCN with input from the user. The NASA Program designator are as follows: EGS, Orion or SLS.
- The second component is the change type designator. The change type is “RCN.”
- The third component is a 5-digit zero-padded number inherited from the RCN record number assigned by the OMS application.

Example RCN numbers:

- GSDO-RCN-00097, GRND-RCN-05467

Note: Format for EGS RCNs assigned prior to 2/16/2018 is GSDO-RCN-01437

- Orion-RCN-00014, Orion-RCN-00214
- SLS-RCN-00011, SLS-RCN-00345

- The initial RCN is a “Basic” version. “Basic” will not be displayed by the OMS application. If at a technical revision level above the basic version, the revision will be designated by a letter starting at “A,” “B,” “C,” etc. and will be assigned by the Sponsoring Integrator. No revision designation implies the RCN is at the “Basic” level. Note: “Technical Rev” is provided by the OMS application

Example RCN Number:

- GRND-RCN-05467 Technical Rev A

If an Administrative revision is needed, an administrative designator will be added as a suffix to the RCN number by the PSA. The administrative RCN will retain the RCN number and the revision letter of the RCN (if any) and the administrative designation to the RCN number; e.g., Admin 1, Admin 2. Note: “Admin Rev” is provided by the OMS application.

Example RCN Number:

- GRND-RCN-005467 Technical Rev A Admin Rev 1

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## 7.3 DEVIATION AND WAIVER NUMBERS

### 7.3.1 Draft D/W Numbers

The OMS application assigns a database record ID to the Draft Deviation/Waiver (D/W). The database record ID of a draft D/W number format is as follows: Noncompliance Record ##### - Draft.

### 7.3.2 D/W Numbers

The D/W number is comprised of three components. The format is as follows “GRND-D/W-12345” where:

- The first component is the NASA Program designator. This component signifies which program’s initiated the D/W. The NASA Program designator are as follows: EGS, Orion or SLS.
- The second component is the change type designator. The change type is “D” or “W.”
- The third component is a 5-digit zero-padded number inherited from the D/W record number assigned by the OMS application.

Examples D/W numbers:

- GRND-W-0632, GRND-D-07022
  - Orion-D-07001, Orion-W-07002
  - SLS-D-07234, SLS-W-07438
- The initial approved D/W is a “Basic” version. “Basic” will not be displayed by the OMS application. If at a revision level above the approved version, the revision will be designated by a letter starting at “A,” “B,” “C,” etc. and will be assigned by the Sponsoring Integrator. No revision designation implies the D/W is at the “Basic” level.

Example D/W Numbers:

- GRND-D-00097 Rev A
- GRND-W-00098 Rev A

## 8.0 OMRS / RCN PROCESSING

The OMRS and RCN process, including a description of roles and responsibilities are outlined in the following sections and the OMRS/RCN Processing flow chart Figure .

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## 8.1 OMRS RECORD PROCESSING

Candidate OMRS processing begins in the draft state and progresses to a preliminary state. The OMRS processing state definitions are provided in Table 2 OMRS Status.

### 8.1.1 Draft OMRS

The OMRS Author prepares the draft OMRS in their OMS workspace, and the OMS application adds the new OMRS record to the database. The draft OMRS defaults as viewable to authors and sponsoring integrators within their permission group of their program/element. The author may make the OMRS record viewable to others outside their permission group by adding that person to the cc list or by removing visibility restrictions to allow visibility to multiple users. The author works with the Sponsoring Integrator to mature and coordinate the draft content with other stakeholders as required.

When the draft OMRS has been sufficiently matured, it is ready to be promoted to the preliminary OMRS state. The OMRS Author requests promotion of the draft OMRS via a Sponsoring Integrator through the OMS application.

### 8.1.2 Preliminary OMRS

Once the OMRS has been promoted to preliminary, the author can no longer make changes to the OMRS, changes are made by the Sponsoring Integrator. Preliminary OMRS may continue to be integrated and matured within OMS until they are ready to be bundled into a draft RCN. When the Sponsoring Integrator promotes the OMRS record to preliminary the OMRS record is viewable by all OMS account holders with the associated SBU permissions (e.g., Limited Rights).

### 8.1.3 OMRS Cloning, Version Cloning (Revising) and Linking

The OMS application provides methods to facilitate creating new requirements, making requirement changes, and linking requirements.

#### a. Cloning requirements

The OMS application provides the capability to clone an OMRS record and update the cloned requirement as needed. For example, new OMRS may be generated to make technical changes on future mission requirements by cloning an existing requirement. The cloned requirement will be assigned a new OMRS draft number. An interim screen allows selected fields to be changed before creating the cloned requirement. When the cloned requirement is promoted to preliminary, the OMS application will assign the OMRS number.

Cloned requirements will reflect the same program, element or component as the original. Prior to the OMRS going to the preliminary state, changing the element



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or component would require a system administrator to implement this request. Once the OMRS has been promoted to preliminary the element or component cannot be changed.

The link relationship between the cloned records can be graphically viewed, and the link can be removed.

b. Version Cloning - Revising approved requirements

Version cloning makes a working copy of the approved OMRS for proposing changes without affecting the current approved OMRS. The version clone will have a status of draft, and will retain the approved OMRS number with a version designation of a dash D (e.g., S.CS.EPS.0001-D). The version clone will be processed like any other draft OMRS, and after promotion to preliminary is bundled into the modified section of the RCN. Once the RCN is approved, the version clone will inherit the existing approved OMRS number by dropping the dash D. The previous approved versions of the OMRS will become superseded with a dash S number designator (e.g., S.CS.EPS.0001-S1). The following hierarchy example shows the revision history from current to past (S.CS.EPS.0001, S.CS.EPS.0001-S2, S.CS.EPS.0001-S1).

c. Linking requirements

The OMS application provides a method to manually link requirements. Linked OMRS can be viewed in a list or graphically. Cloning a requirement automatically creates a link from the original requirement to the cloned requirement. The cloned requirement link can be retained or deleted as required. Requirement linking is informational and is not controlled by RCN and has no implication to requirement implementation.

Not all information regarding an OMRS is duplicated when a record is cloned (e.g., Visibility Restrictions, File Attachments, linked LCC, FMEA/CIL and/or Hazard Reports). All OMRS data fields of the cloned requirement must be verified to contain the applicable data.

## 8.2 RCN PROCESSING

The RCN processing workflow begins with the RCN record in the draft state and progresses as described below. The RCN processing state definitions are provided in Table 3 RCN Status.

### 8.2.1 Draft RCN

The Sponsoring Integrator generates a draft RCN. This draft RCN process facilitates bundling of OMRS to ensure efficient integration, maturing, review and future approval (e.g., bundle single element, single system/subsystem OMRS or multiple OMRS for a

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specific test). Bundling criteria is up to the preference of the integrators and RCN content will be collaborated by authors, reviewers and integrators during RCN draft, preliminary and review processing.

New and modified OMRS and OMRS to be removed or made historical can be bundled in the draft RCN.

### **8.2.2 Preliminary RCN**

After completing the OMRS bundling, the Sponsoring Integrator promotes the RCN to preliminary status. The Sponsoring Integrator assigns the technical need date and impact need date. The technical review and comments are to be completed by technical need date, and the impact assessment is to be completed by the impact need date.

If known, the suspense date and the OMRSP date may be provided at this point. The suspense date establishes a date for reviewers to approve their formal responses in OMS. The OMRSP date indicates when the OMRSP is to complete their review.

The Program Integrators responsible for reviewing the RCN are also responsible to assure that these dates are met, or request an extension through the initiating program's Integrator. The agreed to dates should be reflected in OMS for the applicable RCNs.

Program Integrators identify mandatory reviewers within their program for comments and impact assessment to build their unique RCN concurrence matrix. Coordination continues until agreed to comments are incorporated by the Sponsoring Integrator and impact assessments are complete.

During the preliminary RCN review process, the Sponsoring Integrator will coordinate technical comments with the OMRS authors. If a specific OMRS requires the author to incorporate changes, the Sponsoring Integrator may demote the OMRS back to draft in order to allow the author to make changes and then the OMRS can be promoted to preliminary while still linked to the RCN.

All RCNs with issues that cannot be resolved by the integrators will be brought forward to the OMRSP for mitigation prior to the RCN being promoted to review. This includes issues related to technical, cost, schedule or risk. In addition, issues related to GSDO-PLN-1076 and associated annexes will also be addressed by the OMRSP.

Each program will have a unique concurrence matrix generated by the Program Integrator within OMS for each RCN. The following functional responsibilities are required to be encompassed with the applicable concurrence matrix where appropriate across the three Programs: technical, budget, schedule, and Safety and Mission Assurance (S&MA). After technical maturing of the RCN, impacts will be reflected in the

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RCN concurrence matrices. Impacts above the baseline should be identified (e.g., scope, cost, documentation, hardware, risk, schedule, software).

The Sponsoring/Program Integrator assesses the RCN/OMRS readiness and confirms all the concurrence matrices are ready for endorsement by coordinating with the other Program Integrators. When the Sponsoring Integrator determines the RCN is ready, the suspense date is set, which is the date for reviewers to approve their formal responses in OMS. The OMRSP date is also set, and all votes should be submitted prior to the OMRSP meeting.

### 8.2.3 RCN Review

When an RCN is in the review state, the OMRS records are locked from any further updates. The Program Integrators and Exploration Systems Development (ESD) are now responsible to assure that the concurrence matrices signatures are complete by the suspense date, and the voting is complete by the OMRSP date, or request an extension through the Sponsoring Integrator.

Each program's concurrence matrix is a tool that supports development of the respective Program's vote. Reviewers identified in the concurrence matrix should enter their response in OMS, and set their signatures to approve.

The RCN vote is the formal response expressing the official position for the program, ESD or other affected organizations that may have a vote (e.g., Crew Office). The program teams should review the RCN and submit their vote(s) prior to the OMRSP date. Votes may be changed prior to the RCN being promoted to a status of Board Review.

The concurrence matrix responses and vote responses are listed in Table 3.

**TABLE 3 RCN VALID RESPONSES**

| Concurrence Response            | Concurrence Status Code |
|---------------------------------|-------------------------|
| Concur                          | C                       |
| Concur with Comments            | CC                      |
| Non-Concur with Rationale       | NC                      |
| Concur with Impact              | CI                      |
| Concur with Comments and Impact | CCI                     |
| Not Applicable with Rationale   | NA                      |

The Sponsoring Integrator reviews the votes and coordinates with the appropriate Program Integrators to develop a presentation, as required. If the votes are all concur,

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then the OMRSP will begin review of the RCN as a candidate for approval. The OMRSP lead will provide the final vote (concur or concur with comments) prior to the OMRSP members meeting for final approval.

If the votes are not all concur, then the Sponsoring Integrator coordinates with the appropriate Program Integrators to develop a presentation to be shared with OMRSP members. The presentation will be utilized as part of the OMRSP review, and if necessary for the Board Review. The OMRSP facilitates RCN review and issue resolution before elevating to the Board for approval. It is incumbent on each organization to ensure adequate and appropriate representation at the OMRSP. The OMRSP provides one vote in the OMS application as a concurrence to proceed to the Board. OMRS record status should not be demoted while an RCN is in Review unless agreed to by the OMRSP.

Once all the votes are submitted, the OMRSP lead or the PSA will promote the RCN to Board Review to lock the voting.

#### **8.2.4 RCN OMRSP Review and Approval Process within the OMRSP Charter Scope**

- a. If all votes are concur, the OMRSP panel members may approve the RCN through a formal poll.
- b. If changes are administrative as agreed to by the OMRSP members, an administrative revision to the RCN may be approved by the OMRSP. Administrative revisions are minor changes that have little or no significant impact affecting the technical intent of the OMRS, and will not require applicable parties to vote on the changes. These recommended administrative changes will be approved at the panel meeting.
- c. If changes are technical and considered to be minor or limited content as agreed to by the OMRSP members (Ad Hoc membership will be polled and concurrence recorded unless they N/A'd the RCN), a technical revision may be approved by the OMRSP without going through normal technical revision process of demoting the RCN back to preliminary for obtaining new signatures and votes. The OMRSP may approve the changes at the panel meeting, or assign an action to a Program Integrator(s) for coordinating agreement of changes with applicable reviewers. Upon coordinated agreement of the changes, the OMRSP will approve the RCN.
- d. Technical and programmatic comments and impacts that cannot be resolved will be brought forward for Board disposition. Any administrative and minor technical changes post OMRSP will also be forwarded to the Board. The PSA will coordinate the Board date. <TBD 8.2.4 d-1>

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When the RCN has been approved by the OMRSP members, the PSA will enter the dispositioning information into OMS, including the directive number. When the PSA updates the RCN record, the associated OMRS records are automatically updated by the OMS application. Only OMRS administrative revisions will be incorporated.

### **8.2.5 RCN Board Review and Approval Process**

The RCN is presented to the Board by the sponsoring and/or Program Integrator with support from the technical community as required. The Board will disposition the RCN. A directive will be issued to reflect that disposition.

The Board may elect to neither approve nor disapprove an RCN, directing further development (see Figure 1). The PSA will coordinate with the sponsoring and/or Program Integrator to resolve.

The PSA is responsible for updating the RCN, based on Board direction (generate an administrative revision, update the RCN status, or demotes the RCN to the Sponsoring Integrator for further processing).

When the RCN has been dispositioned, the PSA will enter the dispositioning information into OMS, including the directive number. When the PSA updates the RCN record, the associated OMRS records are automatically updated by the OMS application. Only OMRS changes as agreed to by the Board will be incorporated.

### **8.2.6 RCN Timeline**

The routine RCN processing time can be typically 15 working days (or less) from the time the RCN is promoted to the review status to the end of Board Review status, however this can be negotiated by the sponsoring and Program Integrators.

If time constraints require a RCN to be expedited, the sponsoring and Program Integrators can agree to an abbreviated RCN review time based on identified constraints. The RCN revision will be marked as “expedited.”

### **8.2.7 RCN Withdrawal**

As a rule, only the Sponsoring Integrator is permitted to withdraw a RCN.

### **8.2.8 RCN Process Flow Chart**

For the corresponding OMRS and RCN process see Figure 1, below.

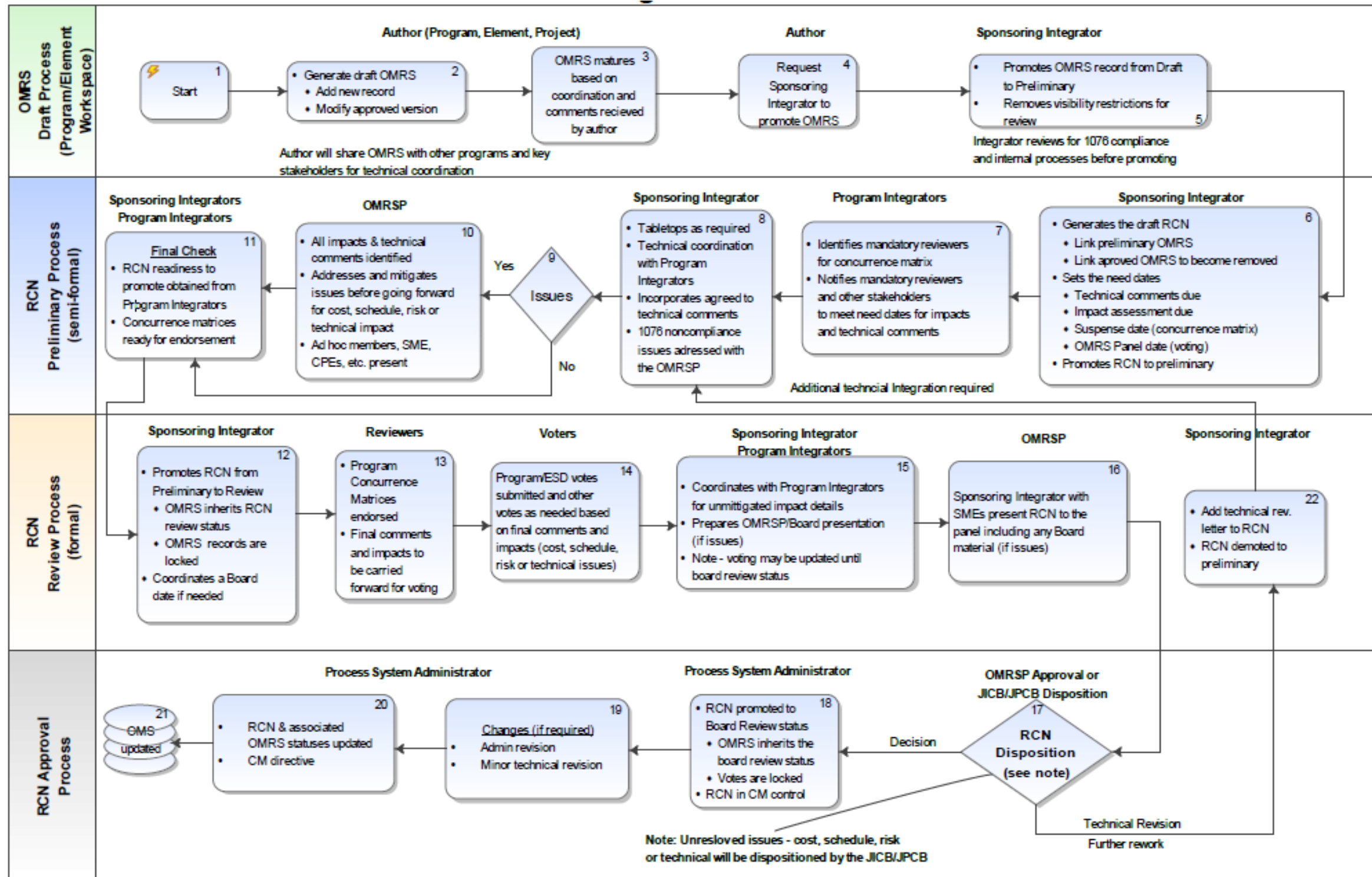


FIGURE 2 CROSS-PROGRAM RCN PROCESS

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## **9.0 OMRS TEMPORARY CHANGES (DEVIATIONS/WAIVERS) PROCESSES**

D/W requests to OMRS requirements may be initiated by any NASA or contractor representative.

### **9.1 DEVIATION/WAIVER PROCESSING**

The D/W processing workflow begins with the D/W record in the draft state and progresses as described below. The D/W work flow processing state definitions are provided in Table 7 D/W Workflow Status. The D/W process, including a description of roles and responsibilities is outlined in the following sections and the routine D/W Processing flow chart Figure 2.

#### **9.1.1 D/W Draft Process**

Note: Block numbers in parenthesis refer to process block number in Figure 2.

A noncompliance may be generated as a result of a non-conformance. The D/W process starts with a confirmed noncompliance (Block 1). OMRS deviations will be coordinated with the design authority prior to non-performance decision, whereas the OMRS Waiver is coordinated with the design authority after occurrence. The OMRS deviation/waiver provides authorization for a temporary departure from the OMRS.

The D/W author prepares the draft D/W in OMS, and the OMS application adds the new D/W record to the database. The author selects the applicable OMRS to link to the D/W record (Block 2). The draft D/W is viewable by all OMS account users with applicable SBU permissions.

The author/Processing Integrator coordinates with the design authority, SME's, SMA and with other stakeholders to identify affected products and/or impacts to be added to the D/W. For a listing of products and impact considerations, reference Section 11.4 D/W BASIC INFORMATION (e.g., impacted products, safety and certification invalidation and risk assessment, etc.) (Block 3 and 4).

Note: Utilize GSDO-FM-1263, Cross-Program OMRS Deviation Waiver Form, until the OMS application is updated to process D/Ws.

#### **9.1.2 D/W Preliminary Process**

The author coordinates with the Processing Integrator to establish the technical/impact need date, the Operations Engineering Review Board (OERB) date, and the approving Board meeting date, and the D/W is promoted to preliminary status. (Block 5)

The Processing Integrator notifies and coordinates with the Program Representatives (e.g., Resident Office). The Program Representative gathers technical comments, risks and impacts within their program, that are submitted to the Processing Integrator by the need date. (Block 6 and 7)

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The author and Processing Integrator review the inputs, and incorporate agreed to comments into the D/W. Identified signatories enter their response in OMS (e.g., NASA and Contractor Processing Engineers, Design Authority SME, and Design Authority Safety). Issues, impacts and risks are carried forward to the boards. (Block 8)

### 9.1.3 D/W Review Process

The Processing Integrator promotes the D/W to review and the D/W is locked from any further updates. Supplemental data (i.e. risk assessment, presentation material) is attached to the D/W record in OMS. D/W signatories set their signature in OMS. (Block 9)

The D/W is presented at the OERB with support from NASA and Contractor Processing Engineers, Design Authority SME, Design Authority Safety, and Program Representation. The applicable program, elements, system/subsystem engineers and integrators attend the OERB. The OERB reviews the D/W and their disposition is documented via the ESD (OMRSP Chair) in OMS, including directed changes. The ESD (OMRSP Chair) and Program Representation concurrence signatures are provided at, or shortly after the OERB meeting.

The PSA updates the D/W with any changes required by the Board. (Block 11 and 13)

The D/W review responses are listed in Table 4.

**TABLE 4 DEVIATION/WAIVER REVIEW SIGNATURE STATUS**

| Action                          | Review Status Code |
|---------------------------------|--------------------|
| Concur                          | C                  |
| Concur with Comments            | CC                 |
| Non-Concur with Rationale       | NC                 |
| Concur with Impact              | CI                 |
| Concur with Comments and Impact | CCI                |

### 9.1.4 D/W Board Review

The PSA promotes the D/W from Review to Board Review. Concurrence signatures are locked from further updates. The PSA requests the next available Board meeting date. Presentation materials to support the D/W will be provided to the approving board.

All non-compliances to the OMRS shall be dispositioned by the approving Board . (Block 12)

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### **9.1.5 D/W Approval**

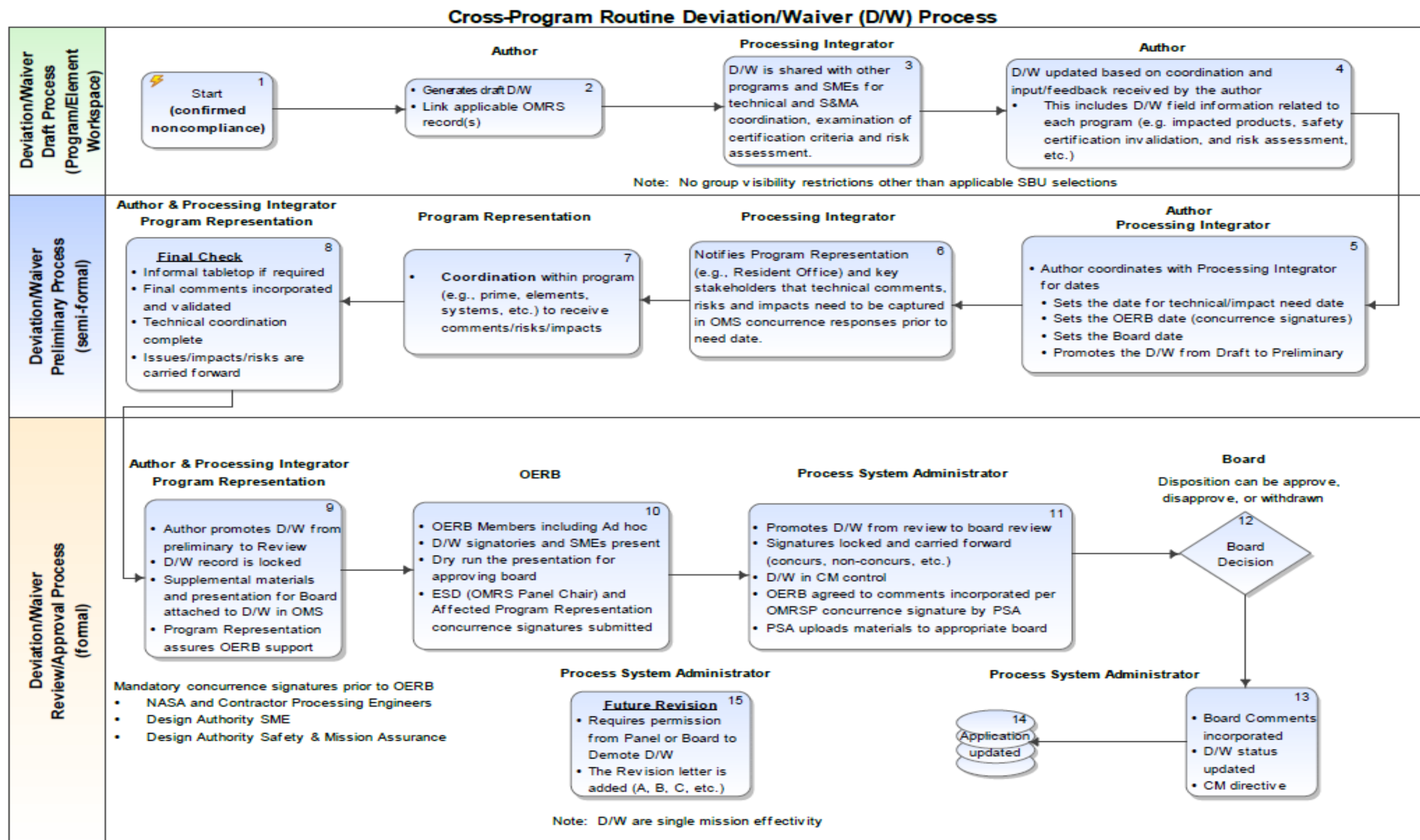
The D/W is presented to the approving board by the author with support from the design authority and all stakeholders. The approving board will disposition the D/W as approved, or disapproved. A Board directive will be issued to reflect that disposition. D/W updates, if any, as a result of the disposition by the approving board, are performed by the PSA. The PSA updates the D/W record status as dispositioned by the board directive, including recording the directive number to the D/W record. (Block 12, 13, 14 and 15)

### **9.1.6 D/W Revisions**

A D/W revision requires the concurrence from the OERB and approving Board. In the event a D/W requires revisioning, the D/W will then be demoted, revised and processed as applicable to the next revision. (Block 15)

### **9.1.7 D/W Routine Process Flow Chart**

For the routine OMRS Deviation and Waiver process, see Figure 2, below.



**FIGURE 3 CROSS-PROGRAM ROUTINE DEVIATION/WAIVER PROCESS**

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## 9.2 DEVIATION/WAIVER PROCESSING DURING LAUNCH COUNTDOWN

The authority to disposition OMRS D/Ws transitions from the Board to the Mission Management Team (MMT) beginning at L-2 day review. (Reference GSDO-PLN-1129, Cross-Program Integrated Launch Operations Implementation Plan). D/Ws that have not been approved prior to L-2 Review are forwarded to the MMT.

**TABLE 5 OMRS DEVIATION/WAIVER APPROVAL PROCESSING**

| D/W Authority   | Timeframe                                    | Review / Approval                | Artifact                                      |
|-----------------|--|----------------------------------|---|
| Approving Board | Prior to L-2 Review                          | Next Approving Board (ref 9.1.4) | OMS D/W                                       |
| MMT             | Beginning at L-2 Review                      | Next MMT meeting <sup>1</sup>    | OMS D/W                                       |
| MMT             | Terminal countdown beginning at cryo loading | MMT briefing / approval          | Approval over OIS-M, OMS D/W update to follow |

<sup>1</sup> L-2 MMT Review, L-1 MMT Review (if performed), Pre-Tanking Briefing, post-scrub MMT

## 9.3 DEVIATION/WAIVER PROCESSING L-2 DAY REVIEW TO CRYO TANKING START

During this Launch Processing timeframe the designated D/W author and Sponsoring Integrator is the Operations/Launch Project Engineer. The Program Voting Matrix is not utilized.

### 9.3.1 D/W Draft Process

A noncompliance may be generated as a result of a non-conformance. The D/W process starts with a confirmed noncompliance. OMRS deviations will be coordinated with the design authority prior to non-performance decision.

The author prepares the draft D/W in conjunction with the Subject Matter Experts. The author selects the applicable OMRS to link to the D/W record. The draft D/W is viewable by all OMS account users with applicable SBU permissions. The D/W is matured and coordinated with other stakeholders as required. Coordination includes examination of certification criteria, risk assessment and other impacts.

### 9.3.2 D/W Preliminary Process

The Sponsoring Integrator verifies all applicable data fields have been completed. The Sponsoring Integrator coordinates with the Program Integrators, and may include tabletop reviews with key stakeholders, as required. The Sponsoring Integrator

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incorporates agreed to technical content changes into the D/W. Issues/impacts are carried forward to the MMT.

### **9.3.3 D/W Review and Approval Process**

The Sponsoring Integrator promotes the D/W to review status. When a D/W is in the review state, it is locked from any further updates. The Sponsoring Integrator assembles supplemental materials and presentation data for the MMT.

The Sponsoring Integrator requests promotion of the D/W from Review to Board Review through the PSA. When in Board Review, the D/W is managed by the PSA. The PSA uploads applicable D/W material to the MMT website.

The D/W is reviewed by the MMT. The disposition choices are to approve, disapprove or withdraw the D/W. If there are MMT comments to the D/W that affect the D/W content, the PSA will incorporate. The PSA/CM prepares the MMT directive, and updates the D/W status in OMS.

### **9.3.4 D/W Revisioning**

In the event D/W requires revisioning, permission is required from the MMT. The D/W will then be demoted, revised and processed as applicable to the next revision.

### **9.3.5 D/W Cross-Program L-2 to Start of Cryo Tanking Process Flow Chart**

For the OMRS Deviation and Waiver processing from L-2 to Start of Cryo Tanking, see Figure 3, below.

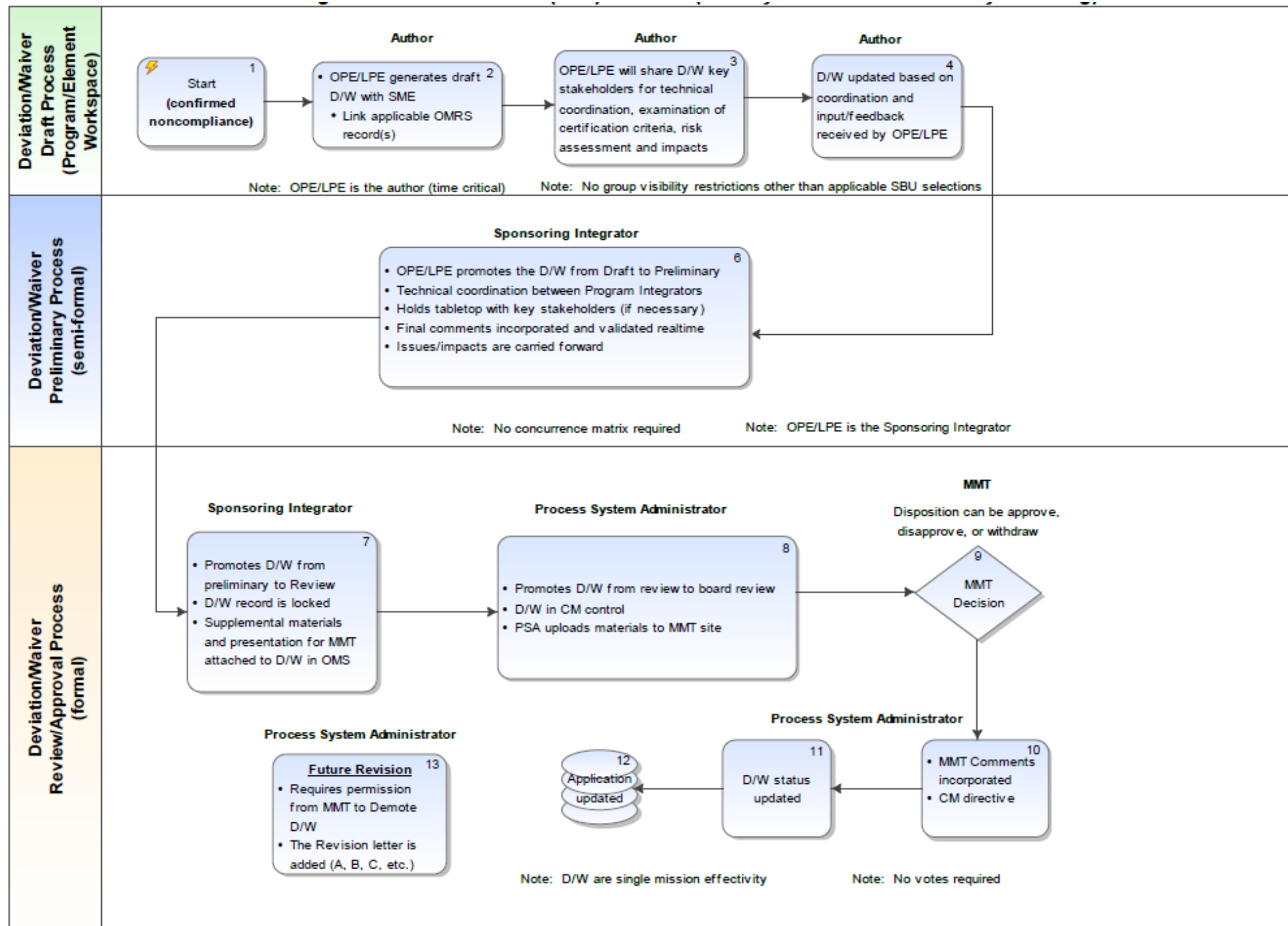


FIGURE 4 CROSS-PROGRAM L-2 TO START OF CRYO TANKING DEVIATION/WAIVER PROCESS

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#### 9.4 DEVIATION/WAIVER PROCESSING DURING TERMINAL COUNT

The following procedure will be used for processing D/Ws during the terminal countdown time frame beginning at cryo loading.

- a. All OMRS noncompliance deviations/waivers will be presented to the Launch Countdown Team (LCT) appropriate technical manager via the Operational Intercommunication System (OIS-M [OIS-MOVE where MOVE is Mission Operational Voice Enhancement]).
- b. The LCT appropriate technical manager will present the D/W to the MMT.
- c. OMRS non-compliances will be dispositioned by the MMT on OIS-M and the D/W processed post launch in OMS.
- d. Post launch - documentation will be processed to update OMRS D/W in the OMS application for those OMRS non-compliances that were dispositioned on OIS-M. The Sponsoring Integrator will coordinate the preparation and signing of an outside-the-board directive to record the D/W and its disposition.

If the OMRS noncompliance occurs during the launch countdown time period (start of cryo loading) of T-x hours through T-0, and if that OMRS has a related LCC violation, and the standalone LCC technical rationale developed for the LCC waiver envelopes any and all technical rationale that would be added to the OMRS waiver, it will not require an OMRS waiver to be processed until after launch. The LCC waiver will suffice for the OMRS non-compliance and will be processed per, Cross-Program Launch Commit Criteria Business Practices contained in the Cross-Program LCC Management System application (CP-LMS).

Deviations and waivers associated with Landing and Recovery operations are the responsibility of the Board and will be processed using the D/W Routine Process flow, see Figure 2.

#### 10.0 RCN COMPONENTS

RCNs may contain one or more OMRS records. New and revised OMRS are generated in a draft state, and when promoted to preliminary status, will become available to be assembled into an RCN. The RCN data fields listed below provide definition and information to facilitate the RCN process. The minimum RCN data fields for reporting are identified below. Cross-Program report formats will be contained in the appendices.

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## 10.1 RCN CONTENT

An RCN shall consist of the following sections:

- a. Header data
- b. Footer data
- c. Basic Information, Voting Summary, Voting Matrix
- d. OMRS Index
- e. Concurrence Matrix
- f. OMRS Content

## 10.2 RCN HEADER DATA

- a. RCN number  
The RCN number is system generated - see details in Section 7.2. RCN Revision level
- b. Program, Element, Status, CP-OMS record number.
- c. RCN Type (Documentation or Technical), RCN Processing Priority (Routine/Expedite), RCN Effectivity and Directive Number.

## 10.3 RCN FOOTER DATA

- a. RCN Number
- b. RCN last modified date and time
- c. RCN status watermark
- d. Page numbers: Page numbering includes the page number and the total number of pages (e.g., Page 1 of 2, Page 2 of 2).

## 10.4 BASIC INFORMATION, WORKFLOW VOTING SUMMARY, VOTING MATRIX, CONCURRENCE MATRIX

- a. Basic Information  
RCN Title - Each RCN shall have a short descriptive one line title for report generation purposes.  
Author/Sponsor - Text area to identify the author and any sponsors of the RCN.
- b. Description of Change - Describe what the OMRS change is, i.e., state and/or summarize what the OMRS content is for new OMRS, or in the case of revising

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approved OMRS describe what is being changed. The Description of Change shall be updated to reflect a summary description of what each RCN revision accomplishes.

Example 1: Remove constraint to verify Booster Nozzle Flex Bearing temperature prior to performing actuator channel tests.

Example 2: Update the callouts for the Insertion Loss of the Flight Termination System (FTS) cable from FTS antenna to Command Receiver/Decoder (CRD) 2.

Rationale for Change - Describe why the OMRS change is required i.e., provide information to substantiate the addition of new OMRS or the need for a change to approved OMRS. Reference any approved directives which apply to the generation of the RCN. The Rationale for Change shall be updated to reflect a summary description of what each RCN revision accomplishes.

Example 1: Channel tests are performed with unpinned actuators with no potential for nozzle movement, as such, flex bearing temperature verification is not required.

OMRSP Revisions - OMRS Panel or board directed revisions to OMRS shall be annotated on each RCN record as applicable.

Draft RCN Tabletop Date - The date of the draft RCN table top meeting with the applicable stakeholders.

Preliminary RCN Tabletop Date - The date of the preliminary RCN table top meeting with the applicable stakeholders.

Technical Need Date - The due date for comments/responses to be submitted by the reviewers.

Impact Need Date - The due date for impacts (e.g., scope, cost, documentation, hardware, risk, schedule, software changes from the baseline) to be finalized by the reviewers. As a guideline, the impact need date is approximately 5 days after the technical coordination/tabletop and comment incorporation is complete. The RCN/OMRS should be mature and stable in order to fully assess the impacts.

Suspense Date - When the RCN is in the review state all reviewers need to approve their response in the OMS application by setting their signatures (e.g., approved).

OMRSP Date - All applicable program/ESD votes are to be submitted prior the OMRSP date. This date is when the OMRSP is to complete their review and submit their vote. If the all the RCN responses are concur (or Not Applicable), the OMRSP is the delegated approving entity.

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Board Request/Approval Date – This is one data field with two purposes. The Board Request Date is when the RCN is requested to be brought forward to the approving board. The Board Request Date is reviewed by the PSA, who coordinates with the board scheduling representative. The Approval Date is the date the RCN was approved by the board.

Approving Board (e.g., OMRSP, JICB, Daily Board, MMT)

Notes: The technical, impact, suspense and board request dates may be adjusted as required by coordination between the sponsoring/Program Integrators.

- c. Voting Summary - A summary of voting members
  - Member (e.g., Programs, OMRSP, ESD, other applicable voters)
  - Representing (voter's name)
  - Vote (e.g., Concur, Concur with comments)
- d. Voting Matrix - A table showing all vote members and voting status code (e.g., C, CC, CI) as applicable
- e. Member Summary (e.g., EGS, Orion, SLS)
  - Vote (e.g., Concur, Concur with comments)
  - Representative - The individual who is responsible for the vote
  - Attachments (if provided) with hyperlink to the attachments in OMS
  - Comments and impacts, as applicable
  - Voter - the person who entered the response in OMS
- f. Concurrence Matrix Summary - A table showing ESD, EGS, Orion, and SLS concurrence matrix and their response status code (e.g., C, CC, CI)
- g. ESD, EGS, Orion, and SLS Concurrence Matrix
  - Reviewer (Reviewers name)
  - Reviewer Role (e.g., KSC Engineering Technical Authority, EGS System Engineer)
  - Representing - A text block allowing additional information about the reviewer (e.g., discipline, office, department) or who you are representing (e.g., a specific name)
  - Response (e.g., Concur, Concur with comments)

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Attachments (if provided) with hyperlink to the attachments in OMS

Review Comments (if provided)

Review Impacts (if provided)

## 10.5 RCN APPLICABLE OMRS SECTION

This section lists and contains the OMRS associated with the RCN.

- CP-OMS number (with hyperlinks to the OMRS record in OMS)
- Requirement Number (i.e., OMRS number)
- Author/sponsor for each OMRS
- Intent - the intent of each OMRS change in OMS (Added, Modified, Removed, and/or Historical)

Note: In the RCN .pdf report, the intent is identified as Add, Modify, Remove, and Historicize.

- The OMRS record is included as a part of the RCN. See Section 6.0 for the OMRS content.

Notes: In the RCN .pdf report, for added or modified OMRS, revision changes are reflected in the content (e.g., technical revisions, administrative revisions). In the RCN .pdf report, for Removed or Historical OMRS, the OMRS status change is reflected in the header and footer.

The OMS application built-in tools enhance the review process of the RCN and OMRS:

Snapshots: Snapshots are reports of the current state of the RCN and/or OMRS record. Snapshots of the RCN and/or OMRS record can be created by the user as required. Snapshots are automatically created by the OMS application when the workflow status is changed. Snapshots are viewed when generating a basic .pdf report.

In the .pdf report, the method to display changes between snapshots, versions and/or revisions is by change tracking markups; deletions are shown in light gray text and red strike-through. Insertions are shown in blue underlined text.

History report: In the OMS application, OMRS field data changes are provided in the RCN and OMRS record History report. The record History report identifies who made the change, when the change was made, what field was changed and identifies the data removed and/or added by each specific field.

The Integrator should review OMRS linkages and cloned requirements to ensure valid OMRS relationships.

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## 10.6 DOCUMENTATION RCN

A Documentation RCN is defined as one which serves as a "documentation only" update and will be utilized to change approved OMRS which do not affect the technical content or implementation. It does not result in any work to be done but rather documents what has already been agreed to by all stakeholders. Documentation RCNs have no impacts recognized by the OMRSP, as agreement has been reached prior to submittal of the Documentation RCN. Documentation RCNs will be promoted for Cross-Program information, review and voting. If comments or issues arise during the process, the Documentation RCN type is to be updated from Documentation to Technical. Mandatory concurrence roles are auto-populated in OMS when a Technical RCN type is created. If an RCN type is changed from Documentation to Technical, the RCN mandatory concurrence roles must be manually populated. Changing the RCN Type attribute can apply anytime during the reviewing process, before the RCN is approved.

Documentation RCNs do not require a concurrence matrix. The implementing organization determines if there are changes to affected products, e.g., WADs, software, schedule, etc.

Documentation RCNs can be used to update fields associated with hazard report updates, correct typographical errors, update reference documentation, non-technical updates, Op Name updates for CUI's (sub-description) and perform global changes to OMRS driven by Cross-Program direction.

- a. OMRS vs. FMEA/CIL, RSAR or HA data may be updated by a Documentation RCN only if the change does not affect the OMRS requirement and the FMEA/CIL and RSAR changes have been previously approved.

When FMEA/CIL, RSAR or HA changes impact an OMRS vs. FMEA/CIL, RSAR or HA data, updates shall be processed as follows:

1. If the FMEA/CIL, RSAR or HA changes are considered an increase in risk (new CILs, upgrades, etc.), the OMRS requirement criticalities are to be updated immediately with the submission of a Documentation RCN following the approval of the FMEA/CIL RSAR or HA changes. If there are no technical changes to the requirements, the RCN will be allowed to be designated as a Documentation RCN.
2. If the FMEA/CIL RSAR or HA changes are considered a decrease or no change in risk, the OMRS requirement criticalities are to be updated with the submission of an RCN following the approval of the FMEA/CIL RSAR or HA changes. If there are no technical changes to the requirements, the RCN will be allowed to be designated as a Documentation RCN.

- b. Correcting typographical errors

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- c. Update reference documentation
- d. Global changes to OMRS driven by Cross-Program direction
- e. Documentation RCNs cannot affect technical content or impact cost, schedule, or risk baselines.

## 10.7 EFFECTIVITY NOT ASSIGNED RCNS

To be classified as not assigned, the RCN must not affect a specific mission. The following is a list of RCN categories which will be acceptable for annotation as non-flight specific.

- a. OMRS vs. FMEA/CIL RSAR and HA update Documentation RCNs
- b. Intent/Rationale and Specification Derivation RCNs (unless mission specific)
- c. RCNs with no technical changes
  - 1. Updates to the effectivity codes.
  - 2. Updates to data controlled by a document other than the OMRS but included in the OMRS, such as reference/source information.
- d. Contingency requirement(s) only RCNs (unless mission specific)
- e. Flight hardware that has not been assigned to a mission but needs requirements to be performed.

Note: an RCN must clearly fit into one of these categories. The OMRSP will be responsible for assessing the validity of an RCN annotated Not Assigned.

## 10.8 RCN STATUS

The RCN status reflects the state of the RCN as it is processed from the time the RCN is created, bundles the OMRS, and is dispositioned. The status designations for RCNs are similar in nature to the OMRS status. Specific roles will be provided the capability to promote and demote RCNs. The OMRS associated with the RCN will follow the status of the RCN from preliminary, review, Board Review, or reflect board disposition.

**TABLE 6 RCN STATUS**

| Status | Notes   |
|--------|---|
| Draft  | All RCNs are initiated as Draft in the OMS application by a sponsoring Program Integrator. Draft RCNs are not under revision control, although the OMS application provides change tracking through audit logs. When RCNs are in Draft status, they are viewable by limited permission groups of OMS account holders. |

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| Status       | Notes  |
|--------------|--|
| Preliminary  | Preliminary RCNs are under Sponsoring Integrator control. The RCN Sponsoring Integrator may make changes to the RCN. If sufficient or significant changes are involved to the OMRS, the Sponsoring Integrator may demote the OMRS back to Draft status for an author to edit. When the RCN is in Preliminary status, they are viewable by all OMS account holders with the associated SBU permissions.                                     |
| Review       | After the individual OMRS records have been assembled into an RCN, and once the RCN is placed into Review status by the Sponsoring Integrator, the OMRS records are then locked from further changes. Changes to the OMRS contained in the RCN will require a revision within the RCN process.   |
| Board Review | After the votes have been submitted, the RCN will be promoted to Board Review by the PSA for disposition. The Sponsoring Integrator can no longer make changes to the OMRS. Voting changes can no longer be made in the Board Review state. Only the PSA can make panel/board directed changes.  |
| Approved     | Approved RCNs contain valid and funded requirements and have been approved through the formal RCN process.   |
| Disapproved  | Disapproved RCNs contain requirements that are no longer valid and/or not funded and have been disapproved through the formal RCN process.   |
| Withdrawn    | The Withdrawn status signifies that the RCN has been Withdrawn by the RCN Sponsoring Integrator. A brief description should be added to the Working Comments under the Workflow Tab to describe the reason for the OMRS withdrawal (e.g., OMRS is no longer required, OMRS is being replaced with other OMRS, OMRS was moved to a non-OMRS system). The Withdrawn status can be applied to an RCN that is in Draft, or Preliminary status. |

## 11.0 DEVIATION / WAIVER COMPONENTS

D/Ws may contain one or more OMRS records. The following are minimum components for a D/W.

### 11.1 DEVIATION/WAIVER CONTENT

A D/W shall consist of the following sections:

- a. Header data
- b. Footer data

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c. Basic Information and Voting Summary

## 11.2 D/W HEADER

- a. D/W Number: The D/W number is system generated with user input, reference Section 7.3.1:
- b. Sponsoring Program and Element
- c. Date of Noncompliance: For a waiver this is the date when the noncompliance occurred, for a deviation, enter the need date for noncompliance approval. This need date should be updated as applicable to support concurrence/approval review.
- d. Directive Number: The number of the dispositioning document assigned to the D/W. The D/W directive number is provided by EGS.
- e. CP-OMS Record: Cross-Program Noncompliance record numbers (CP-OMS ####) are assigned by the OMS application to draft non-compliances when a new noncompliance record is created.
- f. Affected Program(s): Identify the associated Programs of each OMRS. There may be more than one program affected.
- g. Affected Element(s): Identify the affected SLS Element (Booster, Engines, SLS Intg, Spacecraft/Payload Integration and Evolution [SPIE], Stages), for EGS and Orion leave blank.
- h. Revision: Revisions apply after the noncompliance is approved. Note: A revised D/W record in OMS will not receive a new OMS record number. An approved D/W, if revised will be demoted, a revision letter will be assigned and processed as required.
- i. Status: This entry reflects the status of the D/W as it is processed. It is system-supplied and defined as follows (Table 7):

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**TABLE 7 DEVIATION/WAIVER WORKFLOW STATUS**

| Status       | Notes   |
|--------------|---|
| Draft        | All D/W's are initiated as Draft in the OMS application by a sponsoring Processing Integrator/Author. Draft D/W's are not under revision control, although the OMS application provides change tracking through audit logs. When D/W's are in Draft status, they are viewable by all OMS account holders with associated SBU permissions. |
| Preliminary  | Preliminary D/W's are under Processing Integrator control. The D/W Processing Integrator may make changes to the D/W. When the D/W is in Preliminary status, they are viewable by all OMS account holders with associated SBU permissions.  |
| Review       | After the individual OMRS records have been added to a D/W, and once the D/W is placed into Review status by the Processing Integrator, the D/W is locked from further changes.   |
| Board Review | After responses have been submitted, the D/W will be promoted to Board Review by the PSA for disposition. The Processing Integrator can no longer make changes to the D/W. Only the PSA can make panel/board directed changes.  |
| Approved     | Approved D/W's contain approved OMRS non-compliances.   |
| Disapproved  | Disapproved D/W's signify that the OMRS remain valid requirements.  |
| Withdrawn    | The Withdrawn status signifies that the D/W has been Withdrawn by the D/W Processing Integrator. A brief description should be added to the Working Comments under the Workflow Tab to describe the reason for the withdrawal. The Withdrawn status can be applied to a D/W that is in Draft, or Preliminary status.                      |

- j. Time Limited: Provide a yes/no response and if yes, provide a calendar date that the noncompliance expires.
- k. Effectivity: This is the single mission number to which the D/W is applicable. It is provided by the user based on the launch schedule in effect when the D/W is created. It may change by the time the D/W is approved. All D/W are designated a single mission effectivity.
- l. Origination Date: The date that the D/W was input into the system.

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- m. End Item Serial Number (EISN): This is the serial number of the Program/element hardware top assembly (e.g., Engine 2045, ICPS 0001) associated with the D/W, reference to ESD 10026-EM1 –Exploration Systems Development Mission Definition Baseline for Artemis I.

### **11.3 D/W FOOTER**

- a. D/W Number
- b. Last modified Date/time: A system provided date and time stamp identifying when the D/W report was last modified. This data is located in the page footer.
- c. Workflow watermark
- d. SBU Information
- e. Page Number: This is the page number of the report. Page numbering shall include the page number and the total number of pages (e.g., Page 1 of 2, Page 2 of 2).

### **11.4 D/W BASIC INFORMATION, CONCURRENCE SUMMARY**

- a. D/W Title: Each D/W shall have a short descriptive one line title for report generation purposes.
- b. Author: The creator of the OMRS noncompliance record in OMS.
- c. Technical Point of Contact: Provide the technical point of contact for the D/W, include name, email, organization and phone number.
- d. OMRS Number, Category and Title
- e. List all OMRS requirements associated with the D/W (There may be multiple OMRS).
- f. Noncompliance Description
- g. Provide a complete description of the problem creating the need for the D/W. Provide a statement in regards to the root cause of the problem, if known.
- h. Technical Rationale
- i. Provide technical rationale associated with the D/W. The design authority shall provide a statement in the technical rationale which describes if the D/W is associated with any CIL retention rationale, hazard report controls, flight test objective data collection, or invalidates the system/LRU certification. If so, an explanation shall be provided of the flight/mission effects, the associated risk, and the rationale for accepting that risk.

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- j. Provide statement(s) regarding the occurrence applicability of the D/W; does the deviation/waiver apply to one occurrence, multiple occurrences or every occurrence for the processing flow. Example: the deviation/waiver may only apply to Wet Dress Rehearsal (WDR) test and not for Launch Processing (for a requirement that applies to WDR and Launch Processing)

- k. Recommended Action for continued processing

This is a description of the recommended action to allow for continued processing.

- l. Recommended Action to preclude recurrence

This is a description of the recommended action to preclude recurrence of the D/W.

- m. Other Affected Products or Impacts:

List WADs, Drawings, Specifications, Requirements and/or LSAIB, Software, LCC, Flight Rule, Landing & Recovery, CIL Retention Rationale or Hazard Controls, System Certification, Cost, Schedule, Other (e.g., Flight Test Objective [FTO] data gathering capabilities), None.

A mandatory Yes/No (Y/N) response is required for:

1. Does the D/W invalidate any FMEA/CIL Retention Rationale?
2. Does the D/W invalidate any Hazard Controls?
3. Does the D/W invalidate the Hardware Certification?
4. Does the D/W preclude a FTO?

Any yes response requires technical rationale.

Safety, Certification Invalidation or FTO Impact: Each organization (e.g., ESD, Program, Element, FOD) provides inputs for their affected products. The inputs are collected from each organization and the D/W Integrator or CM enters responses under No or Yes, and if Yes, the applicable data is entered. The inputs should be coordinated between all stakeholders and consolidated for the D/W concurring/approving authority (e.g., OERB, Daily Board).

1. Is FMEA/CIL Retention rationale affected by the deviation/waiver? Identify the applicable FMEA/CIL, the FMEA/CIL Criticality and document where the retention rationale has been impacted.

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2. Are any Hazard Controls affected by the deviation/waiver? Identify the applicable Hazard Reports and document where the controls have been impacted.
  3. Are any hardware certifications affected by the deviation/waiver? Identify the applicable hardware certifications and document where the controls have been impacted.
  4. Does the D/W preclude a FTO: Each program provides inputs as applicable: ESD: ESD 10017, Exploration Systems Development Flight Test Strategy and Objectives, Orion: MPCV 72540, Orion Multi-Purpose Crew Vehicle (MPCV) Program: Exploration Mission One (EM-1) and Exploration Mission Two (EM-2) Flight Test Objectives. SLS: SLS-PLAN-100, Space Launch System Program Exploration Mission-1 (EM-1) Flight Evaluation Plan. EGS: GSDO-PLN-1155, Cross-Program Landing and Recovery Nominal End-of-Mission Recovery Plan.
- Impacts: Provide information related to impacts.
- j. Risk: The risk assessment should be coordinated between all stakeholders and consolidated, and attached to the D/W.
  - k. Justification for Revision
  - l. Single selection of "Not Applicable" or "Add Justification". If revision, provide a justification.
  - m. Ground Operations Problem Report Number:  
List the part number, part name and serial number.  
CP PRACA Number: Select the Cross-Program PRACA Number
  - n. Technical/Impact Need Date: One date addresses the technical review and comments are to be completed and impact assessment is to be completed.
  - o. OERB Date: This date is when the D/W is to be taken to the OERB for review
  - p. Board Request/Approval Date: This is one data field with two purposes. The Board Request Date is when the noncompliance is requested to be brought forward to the approving board. The Board Request Date is reviewed by the PSA, who coordinates with the board scheduling representative. The Approval Date is the date the noncompliance was approved by the board.
  - q. Approving Board
  - r. Attachments

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s. Signature Summary:

1. Waiver preparation requires four signatures prior to OERB:

NASA and Contractor Processing Engineer - two signatures to submit the D/W

Examples for EGS executed OMRS

- i. NASA Engineer and Test and Operations Support Contract (TOSC) Engineer
- ii. NASA IT and Kennedy Infrastructure, Applications and Communications (KIAC)

Example for EGS support role OMRS - NASA LX OPE and performing operations program (E2E Test performed per TOSC WAD, Telemetry commands sent by others, may involve Kennedy Uplink Station contractor, etc.)

Design Authority SME - 1 concurrence signature (e.g., Hardware/software provider, Sustaining Engineering organization, i.e., SLS Element (Booster, Stages, Engines, SLS Integrated vehicle), Orion and/or EGS Program)

Design Authority SMA - 1 concurrence signature

2. OERB meeting

Program Representative. Note: for D/W's that affect more than one program, each affected program concurrence is required.

ESD Representative (OMRSP Chair)

3. Approving Board (e.g., Daily Board or JICB)

The directive dispositioning the D/W is signed by approving board chair, no signature is required on the D/W.

## 12.0 OMRS NONCOMPLIANCE POLICY

Each OMRS noncompliance must be dispositioned by an authoritative board as a Deviation (pre-occurrence) or a Waiver (post-occurrence).

A D/W is a temporary change to the contents of the OMRS which provides a detailed description of the change and is utilized as a risk management tool to document deviations from the OMRS. Unlike RCNs, D/Ws do not physically change the technical content of an OMRS requirement. A D/W may be requested for one mission only.

The D/W shall include a recommendation to preclude recurrence, reference Section 10.3 e.

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Processing may continue during the noncompliance approval cycle based upon the following considerations:

- a. When processing activities support real-time coordination with design center/payload representative and that coordination results in agreement to continue processing operations.

As an exception

- b. When processing activities do not support real-time coordination with the design center/payload representative, but technical judgment determines that continued processing best supports personnel safety, or is required to establish a safe configuration, or reduces the risk of damage to flight hardware. Technical judgment includes considerations such as detrimental effects on nominal operations or impacts to restoring the original configuration if the noncompliance is not approved. In these cases design center/payload customer coordination will take place as soon as possible.

A noncompliance OMRS will not require further action if:

- c. The discrepant hardware or software is replaced or corrected and a subsequent retest is successful.
- d. The noncompliance is brought back into compliance with successful retest or re-performance based on approved corrective action taken with documented results (e.g., explained conditions, correction of procedural errors, human errors, test configuration issues) with design authority approval. The noncompliance has been accepted by pre-existing approved documentation (i.e. ADP, MRB) by the design authority (e.g., minor physical damage prior to hardware turnover). This will avoid duplication of same level of risk acceptance.
- e. The discrepant GSE hardware violates the maintenance interval of the effectivity and the OMRS meets any of the following criteria:
  - 1. GSE hardware or its support system being repaired, modified, or down for maintenance and subsequent retest meets the requirement.
  - 2. GSE hardware placed in long term storage. For GSE in long term storage that is reinstated and has exceeded the maintenance interval, a waiver will be required prior to first use.
  - 3. GSE hardware that is not required to support current or future operations and will be transitioned and retired.
- f. An RCN is approved prior to the next applicable milestone or next use which corrects:

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1. A requirement which should have been updated due to an approved design configuration change. The scope of the RCN must be limited to correcting the OMRS fields associated with the configuration change (e.g., specification).
  2. The OMRS is found to be erroneous or ambiguous during work instruction execution, and the intent of requirement was met with design center approval. An RCN will be generated and approved to close out the noncompliance.
- g. The noncompliance is associated with OMRS implementing Landing and Recovery requirements based on a best effort approach specifically stated in the Remarks field of the OMRS. For example, circumstances such as bad weather conditions, contingency rescue/retrieval operation could lead to a noncompliance.
  - h. The noncompliance associated with an OMRS warning is addressed by safety processes for close calls and mishap reporting with concurrence from the design center.

### **13.0 USER-GENERATED REPORTS**

The OMS application provides the user the capability to generate custom reports and notifications as required. The OMS application's "Whining" feature allows user-generated reports based on keywords, timeframes, categories, etc. and allows user to select days/times to report, and other attributes to meet their reporting/awareness needs.

### **14.0 ROLES AND RESPONSIBILITIES**

The following table provides the OMS roles and responsibilities; reference OMRS/RCN Processing flow chart, see Section 8.0 OMRS / RCN Processing Workflow Overview.

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**TABLE 8 OMS APPLICATION ROLES AND RESPONSIBILITIES**

| OMS Roles  | Responsibilities/Capabilities   | Remarks   |
|------------|---|---|
| Reader     | <ul style="list-style-type: none"> <li>– Read, search</li> <li>– User established recurring notification options and report generation</li> <li>– Read any OMRS record (OMRS, RCN, Deviation, Waiver) starting from the preliminary state (with applicable permissions)</li> <li>– Note: All OMS users have this capability</li> </ul>  | OMS general users   |
| Author     | <ul style="list-style-type: none"> <li>– The person designated as responsible for the OMRS, RCN, Deviation, or Waiver</li> <li>– Drafts new or drafts modified OMRS</li> <li>– Drafts Deviations or Waivers</li> <li>– Requests OMRS promotion</li> <li>– Note: OMS allows for the author to be reassigned</li> </ul>   | OMS users who are writing OMRS.   |
| Reviewer   | <ul style="list-style-type: none"> <li>– Review, assesses and provide concurrence/comments to RCNs, Deviations and Waivers</li> </ul>   | OMS users who assess, review and provide concurrence assessments for preliminary OMRS                                   |
| Voter      | <ul style="list-style-type: none"> <li>– Supplies the Program vote</li> </ul>   | OMS voters provide the program vote into OMS.   |
| Integrator | <p>Sponsoring Integrator</p> <ul style="list-style-type: none"> <li>– Coordinate development of OMRS changes and integrate within elements / Programs.</li> <li>– Changes the status of OMRS from draft to preliminary.</li> <li>– Associate preliminary OMRS into appropriate RCN groupings and have the authority to promote RCNs from draft through review.</li> <li>– Manage all changes to the requirements once OMRS are promoted to preliminary</li> </ul> | A Sponsoring Integrator may also perform the responsibilities of a Program Integrator at the discretion of the Program. |

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| OMS Roles  | Responsibilities/Capabilities   | Remarks |
|------------|---|---------|
| Integrator | <p>Program Integrator / ESD Integrator</p> <ul style="list-style-type: none"> <li>– Represent their respective Programs/ESD for RCN processing from preliminary to final disposition.</li> <li>– Ensure appropriate representatives from within the program/ESD are assessing proposed OMRS.</li> <li>– Performs internal integration for technical comments, impacting, and attend board reviews as required to ensure Cross-Program integration facilitating RCN development.</li> <li>– Manage concurrence matrices, and facilitates voting within their respective Program/ESD.</li> </ul>        |         |
| Integrator | <p>Processing Integrator</p> <ul style="list-style-type: none"> <li>– Represent the sponsoring program for D/W processing.</li> <li>– Performs Cross-Program integration with Program Representation for D/W processing</li> <li>– Ensure appropriate representatives from within their program are reviewing the D/W to assure all technical data, impacts, risk assessments, and comments meet need dates.</li> <li>– Performs integration for D/W technical comments, impacting, and attend board meetings as required to ensure Cross-Program integration facilitating D/W processing.</li> </ul> |         |

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| OMS Roles                     | Responsibilities/Capabilities   | Remarks                                    |
|-------------------------------|---|--|
| Program Representation        | Program Representation (e.g., Resident Office) <ul style="list-style-type: none"> <li>– Represents the affected Program for D/W processing.</li> <li>– Performs Cross-Program integration with Processing Integrator for D/W processing.</li> <li>– Coordinates within their respective Program/Element/Organization to provide a single point of contact / representative on site for D/W processing.</li> <li>– Provides inputs and concurrence signatures on the D/W.</li> <li>– Attend board meetings as required to ensure Cross-Program integration facilitating D/W processing.</li> </ul> |  |
| Process System Administrator  | <ul style="list-style-type: none"> <li>– Promotes RCN from Review to Board Review</li> <li>– Update OMS record status reflecting board disposition</li> <li>– Incorporates administrative changes per board action</li> </ul>   | This role is assigned to CM.               |
| OMS Application Administrator | <ul style="list-style-type: none"> <li>– Overall system administration and software developer</li> <li>– Assign permissions and controls data attributes and field values</li> </ul>  | Data Integration Integrated Technical Team |

## 14.1 VOTING AND CONCURRENCE MATRIX

The following voting members are provided:

- EGS Program
- ESD - Exploration Systems Development
- Orion - Orion MPCV Program
- SLS Program
- OMRSP

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Each Program and ESD vote represent the following stakeholders, which is established by their concurrence matrix:

- a. Budget
- b. Technical
- c. Technical Authority
- d. S&MA
- e. Schedule

## **15.0 OMRS IMPLEMENTATION BY EGS**

An additional objective of this plan is to provide a high level description of the business practices to implement OMRS into operations at the launch, Landing and Recovery site.

### **15.1 OVERVIEW**

The successful implementation of OMRS is one of many key factors required when performing offline processing, integration, testing, launch, and recovery operations. GSDO-PLN-1183, GSDO Program Operations Implementation Plan, provides the roadmap for operational processes and procedures for how the Program and the Operations contractor will integrate within the Cross-Program.

Applicable OMRS will be closed-loop accounted, reference GSDO-PLN-1088, GSDO Program Certificate of Flight Readiness Plan. The steps for closed-loop accounting are described by the following: OMRS will be planned into WADs, the WADs will be written, reviewed and approved, the work will be performed, and OMRS accomplishment will be annotated in the requirements tracking application. The planning, implementation and accomplishment status of OMRS implementation at each step in this process will be available.

EGS implementation of Cross-Program OMRS utilizes a business toolset to manage and perform the work required to process flight and ground hardware. This toolset consists of an integrated suite of commercial off-the-shelf software applications that enable a paperless work environment and provides status in an immediate and collaborative environment (e.g., TOSC Integrated Processing Solutions [TIPS]).

### **15.2 REQUIREMENT PLANNING**

The OMRS closed-loop requirements tracking application (e.g., TIPS RMA) facilitates and ensures OMRS are planned into the WADs. Requirements allocation matrices will be utilized to assign the OMRS to an implementation owner and their corresponding WADs. To maintain requirement traceability, the work instructions will contain trace information derived from the OMRS (e.g., OMRS number and OMRS title).

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### **15.3 WAD AUTHORIZING, DEVELOPMENT AND REVIEW**

The WADs will be written using a work instruction processing system (e.g., Solumina) which provides work instruction authoring, development, and review (including Original Equipment Manufacturer review and integration). The applicable OMRS technical content, in addition to many other types of inputs, are written into work instructions in order to fully implement the requirements.

### **15.4 OMRS ACCOMPLISHMENT**

Requirement closed-loop tracking is performed systematically on a real-time basis using data interfaces between work execution application and the closed-loop requirements management application. Upon performance of the required work operations and work step(s) in WADs, the work execution application will provide results to the requirements management application for automated status of requirement accomplishment.

### **15.5 OMRS IMPLEMENTATION STATUS**

The planning, implementation and accomplishment status of the OMRS at each step in this process will be available thru reporting tools for review by the Cross-Programs (e.g., TIPS web portal. Note: Access to the web portal requires an NDC account.)

### **15.6 GENERAL INFORMATION**

All OMRS are to be traceable to their launch site documentation to provide an auditable trail. Mission Specific (e.g., Artemis I), contingency and off-nominal, and GSE OMRS are closed-loop tracked to each instance of performance as part of the mission baseline. LOLI requirements will be planned to not exceed its allocated ground processing cycles/operating time limitations based on the scheduled usage. General OMRS are not closed-loop tracked to each instance of performance.

For OMRS requirements planned into other KSC documentation, i.e., that are not automated within work instructions, the requirements management application will be manually updated. The closed-loop requirements management application will be updated to reflect OMRS D/Ws to approved requirements.

Closed-loop tracked accounting is the process of performing traceability and compliance of program configuration, operation, and maintenance requirements through planning and implementation. Closed-loop tracked provides specific step(s) in WAD(s) where the OMRS is successfully accomplished.

### **15.7 GROUND PROCESSING OMRS OPERATIONS AND MAINTENANCE PLAN**

Trace information derived from the OMRS (e.g., the OMRS number, title, category, effectivity, trigger) will be maintained in the closed-loop requirements management application and collectively is described as the ground processing OMRS Maintenance Plan (OMP). The OMP will contain the applicable OMRS, the associated WAD data and

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planning and scheduling data to effect the processing of flight and ground hardware. Planning and scheduling data includes milestones, constraints, engineering systems, location of the work, etc. Data will be provided to facilitate milestone reporting and CoFR processing.

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## APPENDIX A OMRS DATA ATTRIBUTES

This table provides OMRS field names, a description, acceptable values and/or examples and whether the data is mandatory or optional as applicable to the OMRS field. All fields are locked down at approval of the RCN/OMRS, and require an approved RCN to modify the data, except the SBU field.

OMS output examples are available on the OMRS Panel Wiki.

**TABLE A-1 OMRS DATA FIELD DEFINITIONS**

| Field Name                    | Description   | Acceptable Values and/or Examples  | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|-------------------------------|---|--|--|
| Unique Requirement Identifier | Unique Requirement Number - unique number generated by OMS  | A simple unique numbering schema without strip codes are generated by the OMRS management system   | No   |
| Key                           | Originating Program or Element Requirement Number – Program unique identification for OMRS.   | Allows tracing OMRS back to candidate input data created by the elements or Programs.  | A  |
| Title                         | Requirement Title   | Combined Control System Electronics Activation and Checkout<br>Crew Module Side Hatch Counterbalance Assembly Pressurization for Flight          | Yes  |
| Description                   | Definitive statement of the requirement to be accomplished. The descriptive statement will use action words such as inspect, measure, perform, provide, and document. | (D-1) Verify Core Stage LO2 Tail Service Mast umbilical plate GN2 purge<br><br>(D-1) Verify GHe system leakage below maximum allowable leak rate | Yes  |

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| Field Name      | Description  | Acceptable Values and/or Examples  | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|-----------------|--|--|--|
| Sub-Description | A subordinate item to the Description field that provides additional detail such as specific hardware, command or measurement nomenclature.  | Sub-Description:<br>(S-1) A75107 CS TSM Umb Plate GN2 Prg Pri Press<br>(S-2) A75107 CS TSM Umb Plate GN2 Prg Sec Press<br>(S-1) Battery Unit 1 Heater 1 Current<br>(S-2) Battery Unit 1 Cell Temperature | A  |
| Specification   | The specification is defined as the pass/fail criteria that must be met or parameters associated with a modifiable command needed to satisfy the OMRS. The pass/fail criteria must be definitive and met by verifiable data. The specification attribute shall include any pass/fail criteria to verify functionality, success of operation, or parameters for LOLs, cleanliness, and sampling etc. Multiple specifications can exist for an OMRS and are associated with descriptions and sub-descriptions. | 700-800 psig<br>≤ 1 x 10 <sup>-6</sup> SCCS<br>16.0 +/- 1.0 PSIG<br>> = 3 Amps<br>≤ 24 hours<br>Maximum: 24 cycles<br>Document nonconforming conditions  | Yes  |

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|                          |  |   |    |
|--------------------------|--|---|----|
| Specification Derivation | <p>When numerical values (not discrete values such as ON/OFF or 0/1, etc.) are used in the specification field the specification derivation field can be used to provide a summary level statement detailing the origin of and technical rationale for the specification limits. If the derivation of the specification is formulated from a source such as heritage program, best practice, or lessons learned, this information can be provided. References to supporting engineering documentation can be included. If the technical rationale of the specification is known, this information can be provided. If the Certification Limit of the specification is known this information can be provided. Specification Derivation is intended for numerical specification values but may be utilized for other criteria at the author's discretion. This Specification Derivation may be utilized when considering D/W rationale.</p> | <p>The specification limit is derived from testing in flight like configuration available in test document. The specification timing limit is derived from the expected and tested system response when the O2 cross over valve is configured to the open position and the open discrete is expected to transition to on within two seconds from open command issuance. The specification limit is based on available historical information only. No additional analysis/testing was completed but the test configuration has been analyzed concluding that historical specification limits remain valid. Specification/origin/ design limit derivation information is unavailable for this requirement.</p> | No |
|--------------------------|--|---|----|

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| Field Name   | Description   | Acceptable Values and/or Examples  | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|--------------|---|--|--|
| Rationale    | The reason for the OMRS. Must be descriptive language covering the intent and justification behind generation of the requirement ensuring users are able to understand the purpose. | The purpose of this pull test is to verify the bonding surface preparation, adhesive mixing, application, and adhesive physical properties, and to provide acceptable bond strength for flight.  | Yes  |
| Consequences | The potential technical impact for not performing or not satisfying the intent of the OMRS. Must be descriptive language ensuring users are able to understand the consequences.    | Example 1. Unacceptable bond may cause loss of environmental protection against water, moisture and other substances, resulting in corrosion and contamination that could impact joint performance during ascent/boost phase or loss of structural integrity of the joint metal. This could lead to loss of field joint structural capabilities resulting in Loss of Vehicle, Mission and potential loss of Crew. Additionally, unacceptable bond may result in unexpected debris generation.<br>Example 2. Leaving the valve in the open position or locked and with cover installed will prevent the valve from actuating and will result in a negative pressure differential between the cabin pressure and the external environment, leading to structural damage.<br>Example 3. Contamination may be introduced or corrosion triggered if a positive pressure (purge) is not provided to the RS-25 primary oxidizer seals (each RS-25). Moisture in sealing area would freeze with resulting ice interfering with seal and potential catastrophic consequences when the RS-25 starts. | Yes  |

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| Field Name    | Description   | Acceptable Values and/or Examples   | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)]    |
|---------------|---|---|---|
| Effectivity   | Identifies the mission (s) to which the OMRS applies. Use of Not Assigned designation reflects requirement is not assigned to a specific mission. Use of GM code reflects that the OMRS applies to EGS GSE that requires maintenance. | For example EM-1, EM-2, GM, Not Assigned<br>Note: For effectivities that are selected as "Not Assigned", the trigger field should indicate when the OMRS is to be executed. | Yes   |
| Program       | Identifies the applicability of the requirement to a specific Program.  | EGS, Orion, SLS   | Yes<br>This data is populated via OMS automatically based on element selection. |
| Element       | Identifies the applicability of the requirement to specific flight hardware or GSE.   | Booster, Stages, SPIE, Engines, etc.  | Yes   |
| Component     | Identifies the applicability of the requirement to specific SLS Element's flight hardware.  | RS-25, MSA, LVSA, etc.  | A   |
| System        | Name of the Element System  | Thrust Vector Control, Electrical Power System (EPS), etc.  | Yes   |
| OMRS Category | Reference to the applicable category of OMRS requirement.   | General<br>Mission Specific<br>GSE<br>Contingency<br>LOLI<br>Off-Nominal  | Yes   |

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| Field Name | Description  | Acceptable Values and/or Examples  | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)]   |
|------------|--|--|--|
| Trigger    | A circumstance, event, or condition that necessitates the OMRS to be executed.<br>Note: Contingency or off-nominal category OMRS will use the trigger field to invoke the requirement.<br>Note: Use the trigger field within other OMRS categories (e.g., mission specific or GSE, etc.) to invoke OMRS for execution. | Contingency OMRS<br>Launch Scrub or Launch Halt.<br>Launch scrub while Automatic Destruct Units and FTS S&As are in launch status. Scrub with 48 hours or greater turnaround called after Engine priming complete.<br>Loss of Core Stage purge during all powered operations prior to "Go for Cryo Tanking"<br>Mission Specific OMRS<br>First Spacecraft Activation after a move<br>Global Positioning System Receiver (GPSR) 2 Power-Up<br>Battery Transfer from Internal to External Power<br>Mission Specific OMRS - multiple trigger examples trigger examples<br>1) Prior to Roll-out 2) Prior to Cryo Load<br>1) Spacecraft Activation 2) Any planned Flight Control Module reset<br>1) First planned activation in MPPF 2) First planned activation in VAB 3) First planned activation at Pad | A<br>When Contingency or off-nominal category is selected for an OMRS the Trigger must be defined.<br>When an effectivity "Not Assigned" is selected for an OMRS, the Trigger must be defined. |

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| Field Name  | Description  | Acceptable Values and/or Examples   | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|-------------|--|---|--|
| Constraints | A unique limitation or configuration which must be verified prior to powering or operating a system or component. A limitation which must be adhered to during the performance of a requirement to satisfy the pass/fail criteria. It may be used for exceptions or excursions to the pass/fail criteria for unique circumstances. If unique special GSE/ Special Test Equipment or test equipment is needed to accomplish the requirement, that information should be included in the constraint information. | Constraint -(C-#) All Left Hand (LH) Booster Ground Environment Instrumentation sensors powered.<br>(C-#) LH Booster Master Data Acquisition Unit and Remote Data Acquisition Unit on.<br>Constraint exceptions or excursions –<br>(C-#) While on Vehicle Antennas excursions of Position and Velocity outside of specified ranges are expected due to visibility and multi-path impacts.<br>(C-#) Excursions above 100 F are allowable for 1 hour.<br>(C-#) Do not exceed 40V at the vehicle umbilical for more than 100 milliseconds. After 100 milliseconds the voltage at the vehicle umbilical must be reduced to no more than 35.6V for no more than 8 seconds. After 8 seconds the voltage at the vehicle umbilical must be reduced to no more than 32.0V<br>(C-#) The maximum interval for Reaction Control System monitoring shall be 96 hours to confirm no leakage in the system with the exception of planned extended power downs. | A  |
| Cautions    | Caution – A unique precautionary note which must be observed during the performance of an OMRS that could be potentially hazardous to hardware. Caution notes should not duplicate the intent of standard safety practices. A caution should include a description of potential damage to the hardware.  | (Caution-#) Maximum tank temperature during pressurization is 140 degrees F. Exceeding maximum tank temperature will damage hardware.<br><br>(Caution-#) If Battery Units is <= 27.88 VDC from BU LDAC open circuit monitoring, Battery Cells may be damaged resulting in lower than expected capacity.   | A  |

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| Field Name | Description  | Acceptable Values and/or Examples  | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|------------|--|--|--|
| Warnings   | Warning – A unique precautionary note which must be observed during the performance of OMRS that could be potentially hazardous to personnel. Warning notes should not duplicate the intent of standard safety practices. A warning should include a description of the potential hazard to the personnel. | (Warning-#) Helium will exit the Core Auxiliary Power Unit (CAPU) Exhaust ducts while the ground helium supply is active on the vehicle with associated asphyxiation hazard.<br>(Warning-#) Following drain and purge there will be residual fuel still captured internally in the Auxiliary Power Unit at the Fuel Pump Filter Bowl Cavity which, if released, may result in personnel injury or death.<br>(Warning-#) Increase of GN2 accumulator pressure to a pressure of 90 psia or above places the system in a configuration of being one failure away from an inadvertent firing of the OMS-E. Inadvertent firing of OMS-E may result in injury or death to personnel. | A  |

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| Field Name | Description   | Acceptable Values and/or Examples   | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|------------|---|---|--|
| Remarks    | <p>Remark – any explanatory information as required for clarification of the requirement. Remarks should be used to establish agreements between stakeholders, establish reporting expectations and to state facts and information.</p> <p>Note 1: Remarks may be used for exceptions to the OMRS or descriptions within the OMRS as agreed to by the design center for best effort approach requirements (e.g., recovery operations, general purges), and stated in the remarks field “as best effort approach.”</p> <p>Note 2: Do not use remarks to establish specifications.</p> <p>Note 3: Remarks are binding, however non-adherence to a remark does not require a waiver.</p> <p>Note 4: Remarks may be added in WADs, as agreed to during RCN/OMRS review.</p> | <p>(Remark-#) The Thruster NASA Standard Initiators (NSIs) are accessible from the level of the Forward Bay Deck by working from a padded ladder and reaching into the bay (Remark-#) Monitoring will be performed at 0, 8, 16, and 24 hours after facility and Crew and Service Module environment have been verified static.</p> <p>(Remark-#) Provide data to SLS Structures Thermal and Environments (EV30)</p> <p>(Remark-#) Analysis indicates that pressure will drop and then stabilize after 30 days, at which time the tanks would need to be re-pressurized. If trending indicates stabilization prior to that, re-pressurization can occur earlier.</p> <p>(Remark-#) This requirement will be performed prior to Pad Roll-out Preps.</p> <p>(Remark-#) This operation is to be performed in the VAB prior to the End-to-End test.</p> <p>Remarks providing exceptions:</p> <p>(Remark-#) Safing of Forward Bay Cover (FBC) Mortar NSIs is performed on a best effort basis dependent on recovery of the FBC.</p> <p>(Remark-#) The intent is to have continuous purge when umbilicals are mated. However, in the VAB, the purge is best effort and outages are allowable.</p> <p>Remark agreed to be in WAD:</p> <p>(Remark-#) EGS will provide the ECEF X, Y, Z known coordinates for GPSR (ground) antennas at the VAB via Formal Survey. The coordinates will be listed in the WAD for reference.</p> <p>(Remark-#) A duplicate value is a known and accepted issue for Artemis I, and will be documented in the WAD.</p> | A  |

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| Field Name  | Description  | Acceptable Values and/or Examples   | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|-------------|--|---|--|
| CUI         | A 16 character field identifying commands and/or measurements utilized during satisfaction of the OMRS when the specification or pass/fail criteria are predicated upon the commands and/or measurements.  | GLESES8XTMP084FT (Temperature Measurement)<br>SBEPBCABCDXC16MK<br>(Booster Rock/Tilt Group Command)                           | A  |
| PMN         | PMNs may be utilized to facilitate the identification and tracking of GSE used by EGS at the launch and recovery sites<br><i>Note: This field is applicable to EGS only.</i>   | GG-K-00030-01   | A  |
| Related LCC | Used to identify related Launch Commit Criteria.   | Approved LCC number (s)   | A  |
| Interval    | Identifies the time interval for periodic maintenance or operations.   | Annually,<br>100 hours of operation   | A  |
| References  | Used to identify external references associated with the OMRS. Identify all reference documents.<br><i>Note: When a requirement is identified as having an SBU designation of Limited Rights, the associated Contract number must be included within this field.</i> | Drawing Number, Interface Control Document Number, etc.<br>Controlled documentation are considered to be the latest revision. | A  |

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| Field Name      | Description  | Acceptable Values and/or Examples  | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|-----------------|--|--|--|
| File Attachment | Allows a document to be added to the OMRS much the same as an email attachment.  | Used to capture complex formulas, tables, figures, etc.  | A  |
| FMEA/CIL Number | Identifies the FMEA/CIL number(s) for which the OMRS serves as retention rationale.<br><i>Note: If a FMEA/CIL is anticipated but not yet available, "FMEA/CIL Pending" should be entered in this field. After baselining of the OMRS, this field will have to be updated via a Documentation RCN to add the applicable FMEA/CIL numbers.</i> | If more than one FMEA/CIL number applies, the FMEA/CIL numbers can be included as an attachment to the OMR, and the FMEA/CIL Number Field should state "See Attachment". The attachment should provide the listing of applicable FMEA/CIL numbers and the worst case criticality for each. | A  |
| FMEA/CIL Crit   | For FMEA/CIL or RSAR this identifies the worst case criticality category associated with the hardware and its operation.<br>In cases where there is no applicable safety documentation "None" is to be assigned.   | 1, 1R, 1R2, 1R3, 1S, 2, 2R, 3, None<br>Note: the FMEA/CIL Crit code is not displayed in the OMRS pdf report or OMS Reading Mode.   | Yes  |

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| Field Name                 | Description  | Acceptable Values and/or Examples   | Mandatory Input from Program or Element [Yes, No, A (If applicable to OMRS)] |
|----------------------------|--|---|--|
| RSAR Number                | Captures the RSAR number for which this OMRS provides an operational control. If an item is anticipated but not yet defined, TBD should be entered as a placeholder.<br><i>Note: This field is applicable to EGS only.</i> | Approved RSAR number  | A  |
| HA                         | Captures the HA number for which this OMRS provides an operational control. If an item is anticipated but not yet defined, TBD should be entered as a placeholder.   | Approved HA number  | A  |
| Information Classification | Identifies data sensitivity to comply with SBU requirements. Multiple Values May Be Selected   | SBU, SBU-EAR, SBU-ITAR, SBU-Limited Rights, SBU-Patent Info<br>Note: An absence of any information classification designation selected specifies the data is not sensitive. | Yes  |

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## **APPENDIX B ACRONYMS AND ABBREVIATIONS**

### **B1.0 ACRONYMS AND ABBREVIATIONS**

|        |   |
|--------|---|
| CAPU   | Core Auxiliary Power Unit                 |
| CE     | Change Evaluation                         |
| CEV    | Crew Exploration Vehicle                  |
| CIL    | Critical Items List                       |
| CM     | Configuration Management                  |
| CoFR   | Certification of Flight Readiness         |
| CP     | Cross-Program                             |
| CP-OMS | Cross-Program OMRS Management System      |
| CPE    | Change Package Engineer                   |
| CR     | Change Request                            |
| CUI    | Compact Unique Identifier                 |
| D/W    | Deviation/Waiver                          |
| EAR    | Export Administration Regulation          |
| EGS    | Exploration Ground Systems                |
| EISN   | End Item Serial Number                    |
| EM     | Exploration Mission                       |
| EPS    | Electrical Power System                   |
| ESD    | Exploration Systems Development           |
| ESI    | Exploration Systems Integration           |
| FMEA   | Failure Mode and Effects Analysis         |
| FTO    |   |
| FWD    | Forward Work                              |
| GLS    | Ground Launch Sequencer                   |
| GM     | GSE Maintenance                           |
| GSDO   | Ground Systems Development and Operations |
| GSE    | Ground Support Equipment                  |
| HA     | Hazard Analysis                           |
| IA     | Information Architecture                  |
| ICPS   | Interim Cryogenic Propulsion Stage        |

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|       |   |
|-------|---|
| ID    | Identifier  |
| IMACS | Integrated Measurement and Command System                             |
| ITAR  | International Traffic in Arms Regulation                              |
| ITCO  | Integrated Test and Checkout  |
| JICB  | Joint Integration Control Board                                       |
| JPCB  | Joint Program Control Board   |
| KSC   | Kennedy Space Center  |
| LCC   | Launch Commit Criteria  |
| LCS   | Launch Control System   |
| LCT   | Launch Countdown Team   |
| LH    | Left Hand   |
| LH2   | Liquid Hydrogen   |
| LMS   | LCC Management System   |
| LOLI  | Limited Operational Life Item   |
| LPE   | Launch Project Engineer   |
| LRU   | Line Replaceable Unit   |
| LSAIB | Launch Site Assembly and Integration Baseline                         |
| LVSA  | Launch Vehicle Stage Adapter  |
| MAS   | Mission Assurance Systems   |
| MMT   | Mission Management Team   |
| MPCV  | Multi-Purpose Crew Vehicle  |
| MPPF  | Multi-Purpose Processing Facility                                     |
| MSA   | Orion/MPCV Stage Adapter  |
| NASA  | National Space and Aeronautics Administration                         |
| NDC   | NASA Data Center  |
| NPD   | NASA Policy Directive   |
| NPR   | NASA Procedural Requirements  |
| O2    | Oxygen  |
| OERB  | Operations Engineering Review Board                                   |
| OIS   | Operational Intercommunication System                                 |
| OIS-M | OIS-Mission Operational Voice – Mission Operational Voice Enhancement |

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|       |  |
|-------|--|
| OMP   | OMRS Maintenance Plan  |
| OMRS  | Operations and Maintenance Requirements and Specifications       |
| OMRSP | Operations and Maintenance Requirements and Specifications Panel |
| OMS   | OMRS Management System   |
| OPE   | Operations Project Engineer                                      |
| PRACA | Problem Reporting and Corrective Action                          |
| PMN   | Program Model Number   |
| PSA   | Process System Administrator                                     |
| psia  | pounds per square inch actual                                    |
| RCN   | Requirements Change Notice                                       |
| RMA   | Requirements Management Application                              |
| RSAR  | Reliability and Safety Assessment Report                         |
| S&MA  | Safety and Mission Assurance                                     |
| SBU   | Sensitive But Unclassified                                       |
| SLS   | Space Launch System  |
| SME   | Subject Matter Expert  |
| SPIE  | Spacecraft/Payload Integration and Evolution                     |
| TBD   | To Be Determined   |
| TBR   | To Be Resolved   |
| TIPS  | TOSC Integrated Processing Solutions                             |
| TOR   | Test Objective Report  |
| TOSC  | Test and Operations Support Contract                             |
| TVC   | Thrust Vector Control  |
| VAB   | Vehicle Assembly Building  |
| VDC   | Volts Direct Current   |
| WAD   | Work Authorization Document                                      |
| WDR   | Wet Dress Rehearsal  |

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## APPENDIX C OPEN WORK

### C1.0 TO BE DETERMINED

Table C-1 lists the specific To Be Determined (TBD) items in the document that are not yet known. The TBD is inserted as a placeholder wherever the required data is needed and is formatted in bold type within brackets. The TBD item is numbered based on the section where the first occurrence of the item is located as the first digit and a consecutive number as the second digit (i.e., **<TBD 4-1>** is the first undetermined item assigned in Section 4 of the document). As each TBD is solved, the updated text is inserted in each place that the TBD appears in the document and the item is removed from this table. As new TBD items are assigned, they will be added to this list in accordance with the above described numbering scheme. Original TBDs will not be renumbered.

**TABLE C-1 TO BE DETERMINED ITEMS**

| <b>TBD</b>     | <b>Section</b> | <b>Description</b>   |
|----------------|----------------|--|
| TBD<br>8.2.4-1 | 8.2.4 d.       | Add process clarification when an impact is identified associated with OMRS. The plan packaged for Boards should include GSE, GSE funding, ICD updates to reflect design, etc. as applicable, including OMRS approval. |
|                |                |  |

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## C2.0 TO BE RESOLVED

Table C-2 lists the specific To Be Resolved (TBR) issues in the document that are not yet known. The TBR is inserted as a placeholder wherever the required data is needed and is formatted in bold type within brackets. The TBR issue is numbered based on the section where the first occurrence of the issue is located as the first digit and a consecutive number as the second digit (i.e., **<TBR 4-1>** is the first unresolved issue assigned in Section 4 of the document). As each TBR is resolved, the updated text is inserted in each place that the TBR appears in the document and the issue is removed from this table. As new TBR issues are assigned, they will be added to this list in accordance with the above described numbering scheme. Original TBRs will not be renumbered.

**TABLE C-2 TO BE RESOLVED ISSUES**

| <b>TBR</b> | <b>Section</b> | <b>Description</b>   |
|------------|----------------|--|
| TBR 5.7-1  | 5.7            | Update section 5.7 for Artemis II. Resolve reputed conflict between GSDO-PLN-1076 and Annex 1. |

## C3.0 FORWARD WORK

Table C-3 lists the specific forward work items identified during this document's Change Request (CR) review and evaluation. Each item is given a sequential number (i.e., **FWD 001**). For each item, in the CR/CE field enter the specific number of the CR followed by the comment number from the Change Evaluation (CE) i.e., GSDO-C0345/CE-10, GSDO-C0345/CE-27. Do not include a placeholder for forward work items in the body of the document; list them only in Table C-3.

**TABLE C-3 FORWARD WORK**

| <b>FWD</b> | <b>CR/CE</b> | <b>Description</b> |
|------------|--------------|--------------------|
| None       |              |                    |